CINEMA 4D Release 14 Quickstart Manual

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Preface

MAXON always strives to make the learning process for new CINEMA 4D and BodyPaint 3D users as easy as possible. This includes not only the interface and workflow but also the accompanying documentation. To best serve the needs of our users we have divided the MAXON documentation into four categories, which are designed for users ranging from absolute beginners through to professional user levels:

1. Quickstart Videos

- Level: 3D newbies who want to get to know CINEMA 4D and BodyPaint 3D
- Topics: Navigation and interface, movement, scaling and rotation, creating objects, modifying objects and materials, animation, lighting and rendering
- Location: http://www.maxon.net/downloads.html

2. Quickstart Manual

- Level: Novice users with basic CINEMA 4D or BodyPaint 3D skills
- Topics: see Quickstart manual's table of contents
- Location: Quickstart manual

3. Context-Sensitive Help System Tutorials

- Level: Users with solid CINEMA 4D or BodyPaint 3D basic skills who want to advance their overall level of expertise in specific areas
- Topics: Mechanical modeling, character modeling, materials, lighting and shading, camera and render settings, MoGraph, XPresso, animation, After Effects
- Location: Main menu: Help.

4. Reference Documentation

- Level: All CINEMA 4D users from beginner to professional.
- Topics: All aspects of CINEMA 4D and BodyPaint 3D are explained
- Location: Can be accessed via the application's main menu: Help / Show Help... (documentation must be installed: either automatically via Online Updater or manually as online download).

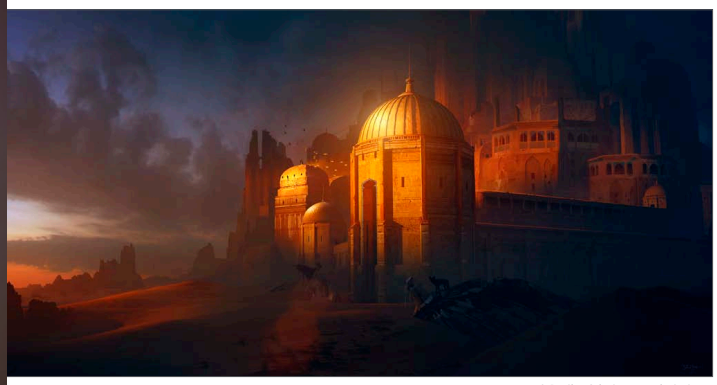
  http://www.maxon.net/downloads/updates-co/documentation.html

Note:

As a result of continued product development, differences between the current and printed documentation with regard to referenced files can occur. The most current versions can be found on the product DVD included in your order, or can be downloaded from the MAXON website or via the Online Updater.

Welcome to CINEMA 4D

After you have worked through this tutorial you will have a good basic user knowledge which you can apply to future projects. In this Quickstart manual you will be asked to open certain files for demonstration purposes. These can be found on your Goodies DVD or on the MAXON homepage on the download / documentation page (www.MAXON.net).



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1. Introduction

To make working with this Quickstart easier, instructional text and tips have been underlain with color for easy recognition.

Instructional text is highlighted in blue.

If you make an error in working through one of the tutorials, these colors will make it easier to locate instructional text and tips when trying to find the location at which you may have made the error.

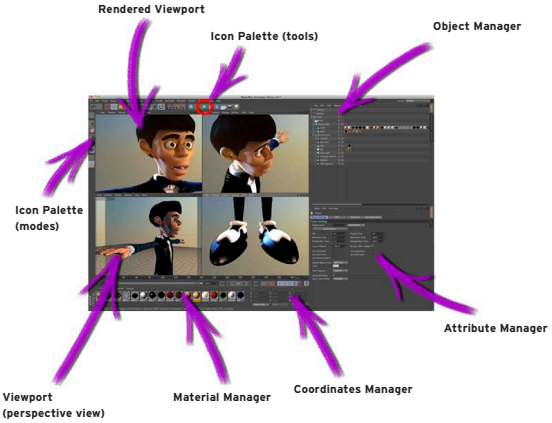
No matter if you're just checking CINEMA 4D out or if you already own your own copy of CINEMA 4D, you already know about the incredible things CINEMA 4D can do. We have been working very closely with our customers for several years now in order to satisfy their needs and wishes. This has lead to the creation and introduction of new functionality, according to their needs. These ideas and concepts are then creatively implemented to satisfy the needs of our customers and those of the 3D markets.

No matter if you work in the field of print, advertising, design, visualization or film, CINEMA 4D gives you all the tools you need to make your ideas reality. The intuitive interface and the ease with which CINEMA 4D can be learned makes entering the versatile world for 3D a snap. CINEMA 4D places a link between your job or hobby, and your creativity in the palm of your hand. You can create what your fantasy demands. CINEMA 4D will be your dependable partner.

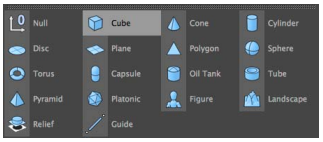
2. General Information / Interface

CINEMA 4D Release 13 offers many new functions that will again speed up and improve your workflow.

Let's start with the most important step - starting CINEMA 4D. After starting CINEMA 4D you will see an image similar to the following screenshot:

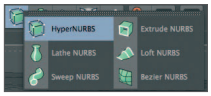


Clicking on the light blue Cube icon opens the parametric object group selection window, which contains all of CINEMA 4D's available parameteric objects. It contains all of CINEMA 4D's available predefined parametric objects.



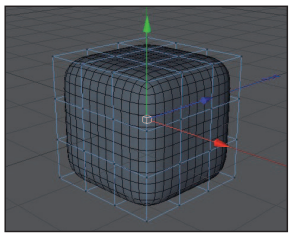
Click on the second icon to create a cube. Click and hold to see all available parametric objects. Note: After an object has been initially created it is a parametric object. An object can only be modified as a whole and not its individual surfaces (an exception are special deformers from the Deformer menu). Before you begin modeling, the parametric object must be converted to a polygonal object. To do so, select the object you want to convert and run the Make Editable command by pressing the c-key on your keyboard. You can now move or modify individual points and surfaces.

Two icons to the right of the Cube Primitive symbol (black cage with white points and turquoise inner) are the NURBS objects. The most important of these is the HyperNURBS object.

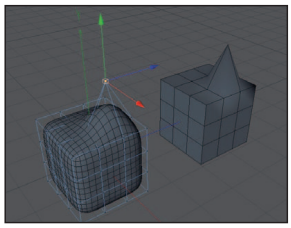


If a polygon object is a sub-object of a HyperNURBS object (create a HyperNURBS object and drag it onto the polygon object in the Object Manager) it will be virtually subdivided to a higher degree. Visually it will be comprised of many more smaller polygons than before the subdivision (the object automatically looks softer / rounder). As you can see in the next screen shot: The outer mesh (light blue) shows the polygon cube's actual subdivision.

The finer inner mesh (blue) shows the subdivision of the HyperNURBS object. Change the cube's display mode by selecting (deactivating) Options / Isoline Editing in the Viewport's menu and switching to Gouraud Shading (Lines) in the Editor's Display menu. In the end it's up to you how you want your objects displayed in the same menu. Then switch to the Use Polygon Mode in the left Icon Palette. However, for this tutorial, this is the most effective way to show the effect HyperNURBS objects have on polygonal objects or primitives since it shows how the cube is subdivided and the final result is therefore also easier to visualize.

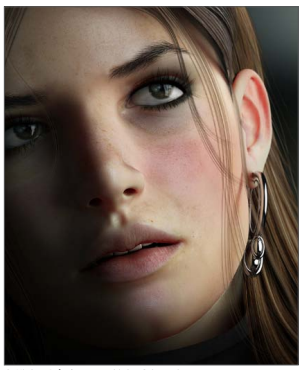


The advantages, especially in modeling, are obvious. Since the object contains few points (edges / polygons) that can be edited it remains very manageable. You can drag just one point of the original wire frame and the HyperNURBS mesh, with its finer subdivision, will follow the point being dragged (The image below shows the same Cube object - one with HyperNURBS and one without).



If the polygon object were made up of such fine subdivision modeling, it would be much more complicated. You would pull one point and only one point would be moved. All other surrounding points would retain their position. You would have to move each one individually in order to achieve the desired shape.

3. Sample Images



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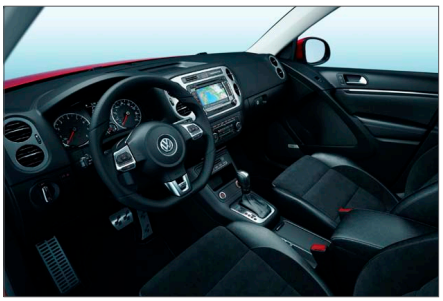

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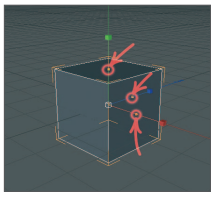
We will continue with navigation in CINEMA 4D.

The first symbol (click – hold – move mouse) moves the view. The second symbol (foreshortened double arrow) lets you dolly in and out and the third (curved arrows with a dot in the center) lets you rotate the scene. Selecting the little rectangle to the right will divide the entire view panel into four views, giving you multiple viewports to use. Each of the four views has its own little rectangle which, when clicked, enlarges the respective window. Create a new scene (main menu: File / New) and subsequently a new Cube in that scene. Zoom out a little and select the word Cube in the Object Manager. The cube's axis will be visible in the editor window.

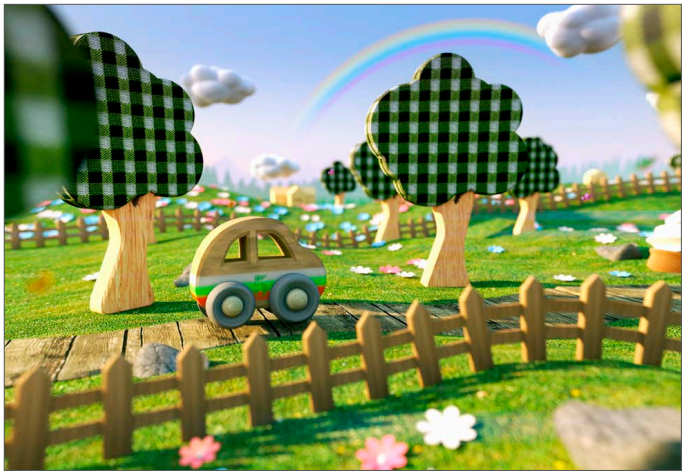
Each of the axis' arrows can be selected and dragged in its corresponding direction. This prevents the object from being dragged in the wrong direction in the editor view. It is often impossible to see in which direction an object is being dragged in a 3D view. A similar method of moving an object in a single direction is to lock a specific axis in the command palette. This prevents an object from being moved in the direction of an axis that has been locked unless you click and drag one of the object's own axis arrows. These objects are not locked. Select the Cube object and then click on the Scale function at top.

The ends of the axis' arrows have changed from arrows to boxes. Dragging these boxes will scale the object along that particular axis. Parametric objects (not converted polygon objects) will display little orange handles.

> **Important:** If you are in Edit Point Mode or Edit Polygon Mode, only the selected points or polygons will be scaled. In addition, we can no longer see the little orange handles as a result of having made the cube editable.



They make it possible to stretch and squash the parametric object on the corresponding axis. The final icon in this group activates the rotation mode. A series of rings will appear around your object - clicking and dragging one of these rings will allow you to rotate the object in the respective direction (heading, pitch or bank).



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4. Quick Tutorial – Materials

A well-modeled object can make a mediocre impression if the right textures aren't used. Textures give a model color, highlights, structure and other important surface properties. A texture placed into the Bump channel, for example, gives the object's surface an uneven, bumpy look without actually altering the geometric structure. This effect can be used to imitate skin wrinkles, scars or the surface of an orange. The displacement channel works in a similar fashion, only that it actually does change an object's geometric structure. Using the Luminance channel you can give an object's surface a self-illuminating property or integrate a subsurface scattering effect (sub-surface scattering) which lends the surface a slight translucent / reflective look, like human skin or candle wax, for example. In short: Textures have the same significance as the outer shape of an object because they are necessary for achieving the desired atmosphere, coloring and surface structure.

We will begin with a brief introduction to the individual material channels:

Color: This is where the material's color or the base color for the texture is set.

Diffusion: This channel makes your texture irregular. Through the application of a shader or a texture your object receives a dirty or dusty look. If desired it can also influence the Specular, Reflection and Luminance channels respectively.

Luminance: The material is given an illuminative property which is also taken into account in the Global Illumination calculation.

Transparency: This is where you determine the material's transparency.

Reflection: Gives the material reflective characteristics.

Environment: A texture is used to simulate an environment reflection.

Fog: This channel lets you apply a fog property to a material.

Bump: Uses an optical trick to translate light and dark elements of a texture or a shader to simulate the height and depth of an uneven surface. Scars, wrinkles or scratches can be simulated using this channel.

Normal: This channel is meant for use with normal textures. Normals give a low-res polygon object a hi-res look when RGB textures containing the required properties are applied. This lets a hi-res polygon object be replaced by a low-res object, thus saving a lot of render time and offering the same visual result.

Alpha: A texture's transparency is determined by a material's light and dark areas. Black equals a transparency of 100% and white makes it opaque.

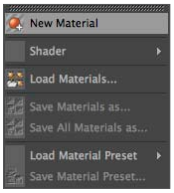
Specular: This determines a material's specular properties.

Specular Color: This determines the color of the material's specularity and can be influenced by a texture.

Glow: Gives the object a self-emitting glow.

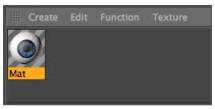
Displacement: Deforms an object using light and dark values (calculates differences in height). Do not confuse this with the Bump channel which only imitates an uneven surface.

We will now create our own material. Open the QS_Material.c4d file. You can see in the Object Manager to the right that the object does not yet have a texture applied to it. Click on CREATE / NEW MATERIAL in the Material Manager at the lower left.



A standard material has been created. If you click on this material its properties will be made visible in the Attribute Manager to the right. In the Basic tab you can determine which channels should be activated for this material. Go ahead and activate the Bump channel. As soon as you have done that a new tab will appear in the Attribute Manager for the Bump channel. Now click on the Color tab and load a texture into the material by clicking on the small arrow next to Texture. Choose Load Image and load Iristexture.jpg.

In the mini-preview of the Material Manager at the lower left of your screen you will see the texture displayed as soon as it has been loaded. This gives you a good overview of the materials being used in the scene.

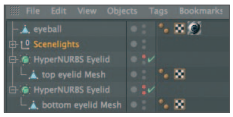


Repeat this procedure for the Bump channel and load Iristexture_bump.jpg into the channel. This JPEG contains the grayscale version of the iris texture which we need to create a relief effect for the surface. You can also choose Filter (click on the small light gray arrow next to the word Texture in the Bump channel) and load the color texture here and set its saturation to -100%. This saves you from having to load a second image. The bright areas of the image will later appear to be raised on the object and the dark areas of the image will appear to be somewhat indented.

A true deformation of the object will only take place in the Displacement channel. The Bump channel does not alter the polygon's surface but uses an optical illusion to give the surface its structure.

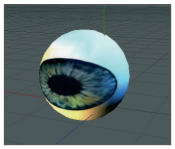
Click on the material in the Material Manager with the left mouse button and drag it onto the Eyeball object in the Object Manager (when you drag the material over the object you can let go once the arrow points down). Alternatively you can drag the material onto the desired object (the eyeball) directly in the Editor. Just make sure you drop the material onto the correct object if there are several in the scene or in close proximity to one another. You can check in the Object Manager to make sure the material was dropped onto the correct object - the material icon will appear next to the object onto which it was dragged.

You have probably noticed that the eyeball brightened somewhat after you applied the material but you aren't able to see the actual texture. We still have to change the offset properties and the mapping size so the texture will be aligned properly on our object. At the moment the actual image of the iris is lying distorted on the right side of the eyeball. You can check this by making both HyperNURBS eyelid objects invisible for the editor. To do this double-click on the top small gray dot to the right of the object in the Object Manager (until it turns red).



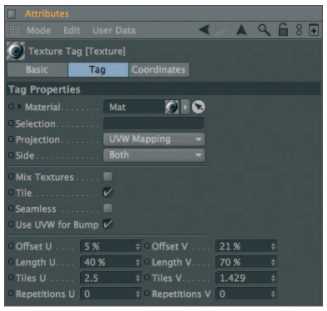
Double-click on the dot again and it will turn green, which makes the objects visible again independent of the visibility settings of any parent object. The dot directly below has the same function except that it affects the rendering.

Once you have made the eyelids invisible and have rotated the view a little the eyeball should look as follows:



Switch the visibility of the HyperNURBS objects back by clicking again on the dots next to the object in the Object Manager, making them gray. Click on the Texture tag at the right of the Object Manager next to the object. It's the material that we applied to the eyeball. You can recognize it in the mini preview of the texture in the Object Manager.

Once you have selected it you will see its parameters in the Attribute Manager. Adopt the settings you see in the next screenshot:



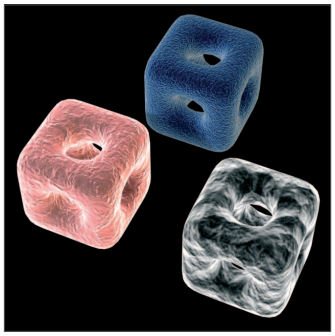
We have just aligned the texture on the eyeball mesh by changing the Length U and Length V parameters. The offset setting put the texture in the correct position. If you rotate your view again you will see that the iris texture is positioned correctly.

Tip: If you want to undo an accidental change to the view just press Ctrl+Shift+Z (Mac: Cmd+Shift+Z). This function is useful if you have inadvertently rotated the perspective view instead of the editor view. You can also select view/undo view in the main menu of the editor view. The texture will complete our model. Experiment with the parameters of the individual channels to find out how they affect the material. At this point we would like to offer you a few additional tips.

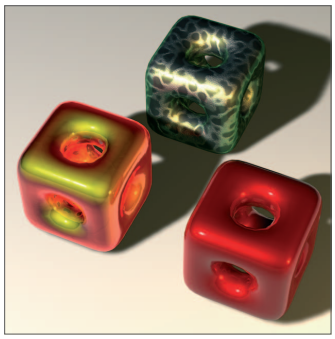
If you own CINEMA 4D Visualize or CINEMA 4D Studio, you can render human skin realistically using Subsurface Scattering. By placing this shader in the Luminance channel (click on the small arrow next to Texture and select Subsurface Scattering from the Effects menu) the effect is created when rays of light meet a slightly transparent object. Some rays infiltrate the object further and are dispersed, others are directly absorbed or bounce off.

Further possible uses for this effect would be for materials such as plastic, milk, candle wax or figurines made of jade. You can load black & white textures into the alpha channel to influence the material based on the texture's brightness, similar to the way you would use them for the bump or displacement channels. The texture's black areas would be rendered with a transparency of 100%. As the texture becomes brighter the transparency is reduced accordingly. White would have a transparency of 0%

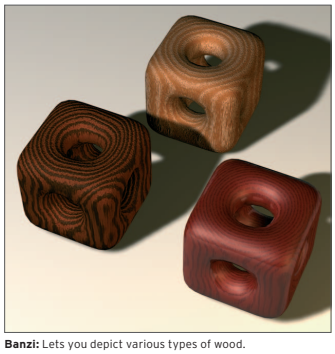
If you choose Shader instead of New Material under Create in the Material Manager you will see a list of 3D shader presets. The advantage of these shaders is that you don't have to worry about mapping your texture or seams in your texture because a 3D shader will be calculated for the 3D space. Here are a couple described in detail:



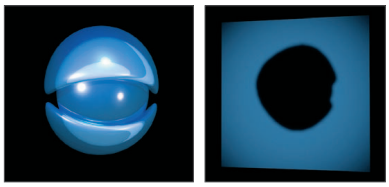
Cheen: Generates an electron microscope effect good for the depiction of bacteria or mites.



Danel: Very good for simulating high-gloss finish.

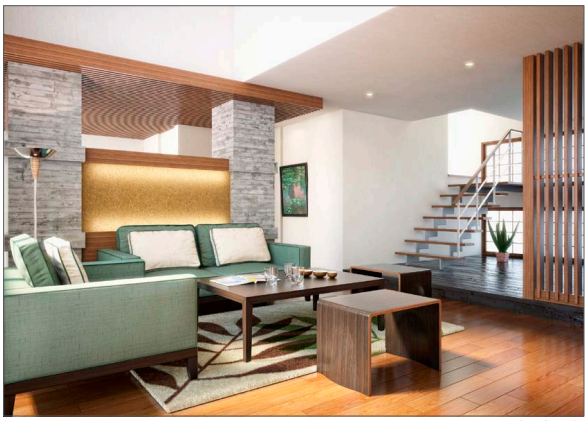


Banzi: Lets you depict various types of wood.



Banji: Calculates complex lighting situations with glass and even makes rear-projection (shadow casting) on partially transparent materials such as rice- or canvas paper possible.

© Glenn Frey



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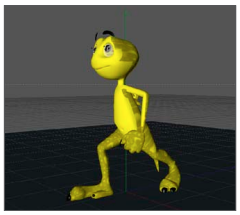
5. Quick Tutorial – Lighting

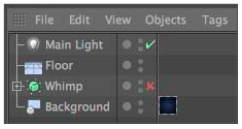
If you are already familiar with lighting a scene in the real world then you will feel right at home with the CINEMA 4D light objects. They can do everything real lights can do – and quite a bit more. In this tutorial we will set up a 3-point lighting arrangement. This type of arrangement is used often in portrait photography to achieve an even lighting and is an excellent method for lighting an object quickly and professionally in the 3D world.

Open the file QS_Light.c4d and adjust your editor view so the entire figure is visible to you.

We want to light up our little character. Create a floor object (Create / Environment / Floor) and position it so the figure is standing on it.

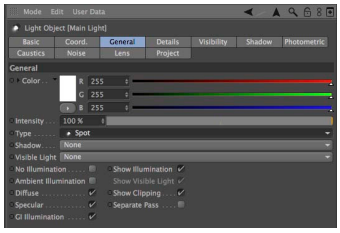


A 3-point lighting arrangement begins with setting a key light. As the name suggests, this light emits the main lighting for the scene and will cast the main shadows. Create a light object (Create / Light / Light). Name it Main Light (double-click on the name) in the Object Manager.



CINEMA 4D has several different types of light sources. The Omni light will always be created by default. An Omni light emits from its center in all directions. For our key light we will need a spot light which we can aim directly at the object.

To make the key light a spot simply go to the Attribute Manager and switch the light from Omni to Spot.



Now our light source has been transformed to a spot. A spot acts like a flashlight. CINEMA 4D offers spots with square and round cones of light. This cone is visible in the editor and can be manipulated. Now we will aim the spot at our figure.

Position the light at the following coordinates in the Attribute Manager:

X= 300

Y= 580

Z= -300

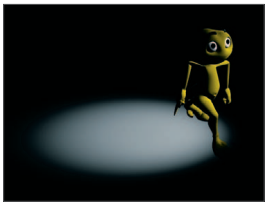
at an angle of

H= 45

P= -45

degrees (enter the values and click on the Apply button).

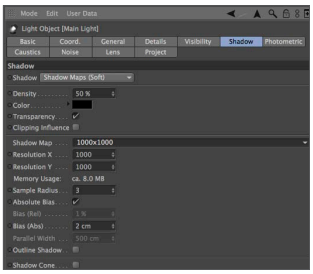
Render the scene (Cmd / Ctrl + r).



The light now falls at an angle onto our object (If this is not visible in the Editor it may be due to the fact that your display mode is set to Quick Shading (uses a single default light source) instead of Gouraud Shading (uses all scene lights)). Of course the exact position of the light is strongly dependent upon the camera's angle. Unfortunately the light is not casting a shadow, letting the figure look like it's floating. CINEMA 4D's lights have an advantage over real light in that you can choose which kind of shadow, if any, they should cast - a plus for any studio photographer.

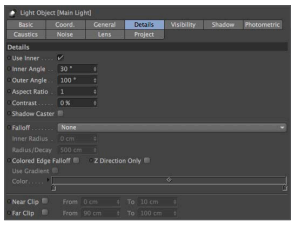
In the General menu of the Attribute Manager, set the light's shadow to Shadow Maps (Soft). We don't want the shadow to be completely black so we'll make it a little transparent.

In the Shadow menu, set the shadow density to 50%. Select 1000 x 1000 as the shadow map. Render the scene.

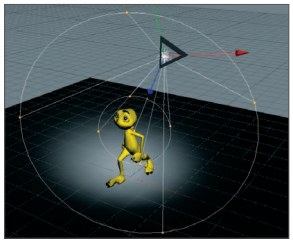


CINEMA 4D offers three types of shadows: Raytraced (Hard) – a shadow with sharp edges, Shadow Maps (Soft) – a shadow with soft edges and Area – a shadow that becomes softer the further it's away from the object, resulting in the most realistic shadow effect. Try the other two shadow types. Careful, the area shadow can take a long time to render! The larger shadow map allows the shadow to be rendered more accurately.

The light's cone is a little too small. We will change this as follows: Switch to the details menu in the Attribute Manager and set the Inner Angle to 30 degrees and the Outer Angle to 100 degrees.



You will see the result in the editor right away. You can also edit the light's cone by dragging the orange handles. If your graphics card will support it you can set the editor's display mode to Enhanced OpenGL with activated shadows. (Viewport: OPTIONS / ENHANCED OPENGL) Generally speaking, OpenGL offers a much more precise depiction of your scene and gives you an impression of how the shadows will fall).



Now we're happy with our key light. Next we will create a more even lighting by brightening our figure a little from the other side.

Create another light source in the scene and name it Brightener. Place it at the following coordinates:

X= -360

Y= 225

Z= -230

Select Area as the type of light.

Since the brightness of the lights in the scene is additive, we must dim the brightener a little.

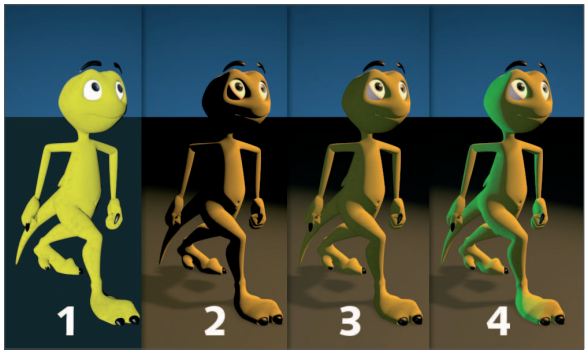
Reduce the Intensity in the General menu to 40%.

This area light illuminates the figure from a different angle and softens the contrast somewhat. It won't cast a shadow since this would cause crossing of the shadows and make the object look bad.

The scene is now pretty evenly lit, but we want to give it a little more pep. Create another light source, name it Color and, in the Attribute Manager, set its type to Infinite. Set its color to turquoise and set its H angle to -160.

The position of an infinite light is irrelevant since it always lights your scene in the direction of the Z axis. This is why we will leave it at the point at which it was created. It gives our Amphibian an interesting color edge and sets him off of the background a little.

Your scene's mood can be changed by simply changing the color of some of the lights used.



That completes our classic 3-point lighting arrangement. Now the real work starts. If the scene has a background, which is often the case, it will have to be lit as well. With the proper use of omni lights details in the scene can be brought to light very nicely. But don't overdo it. With good lighting, less is often more. Only add lights when necessary and if the scene can actually benefit from them. Two more tips before we end: If you have several lights in a scene and are not sure which light is lighting what, simply turn off (green check mark) all other lights in the Object Manager. The light which remains will be the only one visible.

One trick you can use while aiming lights is to view the scene from the perspective of the light. Select the desired light in the Object Manager and activate Set Active Object as Camera in the editor view's Cameras menu. Selecting this option lets you view the scene from the point of view of an active object, in our case the light. Moving the editor view will automatically change the position of the light when in this mode. This way you can see how the change of position of the light affects the lighting of the object in real-time (Gouraud Shading must be active in the editor view). Once you have reached the desired angle and position you can return to the editor view by selecting Use Camera / Default Camera from the Cameras menu.

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6. Tips & Tricks

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CINEMA 4D has been able to build a large community of users around it who are more than happy to help newcomers in any way possible, be it through the use of home-made tutorials, directly in one of the many forums or by offering free models, plugins, expressions or textures.

One of the main sources of information, of course, is the MAXON web site **www.MAXON.net**.

Here you will find news, interesting projects that were done with CINEMA 4D, an extensive CINEMA 4D link library and even a form for questions for our support department.

Flipping through books which don't have anything to do with computer graphics can also be helpful. 3D is a complex field in which many of the classic arts and techniques are combined. Books about photography, lighting, direction, acting, image creation and painting should be part of every serious 3D artist's library. In addition, you will find a wealth of information on all of these topics online.

Since the Internet is always changing, doing a search for CINEMA 4D in various search engines would be a good idea.

The Internet is a good source for finding models. Through its special image search function you can find photos or drawings of practically any object.

Even mail order catalogs can be a great source of information on how an object is supposed to look. Textures are all over the Internet as well. Note that almost all image are copyright protected and cannot be used commercially. Taking your camera and photographing textures yourself is even better. Inspiration is everywhere. You can build your own texture archives in no time.

Try to get away from the technical point of view. Learning a software is only a matter of time. A good 3D artist has the ability to use software as a tool that helps him realize his ideas. The real creativity lies with the idea, not the software. So when you create your next scene don't worry so much about creating the perfect object. Concentrate rather on how you can make a harmonious composition with this object with a fitting theme and proper lighting. Also, think about the message you are trying to send to the viewer. The same goes for animators. A technically perfect animation is a great achievement but it will put your audience to sleep if the concept is bad. It's not so bad, on the other hand, if your animation is a little bumpy and imperfect but your story touches the viewer.

We hope this manual will help you master the technical part of 3D graphics. What you do with what you've learned is in your hands.

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BodyPaint 3D

This is the BodyPaint 3D tutorial. In this tutorial we will explain the most important functions in order to give you a running start in the world of 3D painting. Even if BodyPaint 3D appears to be difficult at first, you will soon notice how intuitive BodyPaint 3D really is. In this tutorial we have also put an emphasis on a fast learning curve and a high degree of user friendliness for this application. Let's start with its structure.

© Kaan Özsoy - www.idapictures.com

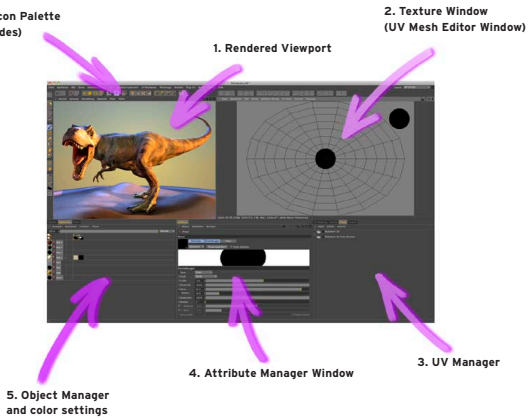
1. Introduction

BodyPaint 3D will revolutionize the way you work with textures in such a way you will wonder how you ever got along without it! With BodyPaint 3D you can paint your models as they are: in 3D. This is what BodyPaint 3D, the revolutionary way to texture objects, is all about. In addition, BodyPaint 3D lets you paint in several texture channels at once, and thanks to RayBrush even directly on the rendered image itself. Projection Painting is a tool we have integrated that makes it possible to paint on complex objects without distortion.

Using the UV-tools you can relax and stretch your UV-mesh, no matter how complex it is. Put simply, a UV-mesh is a second impression of a polygon mesh that projects the texture onto a polygon object. The days of 2D texturing are over and you can finally concentrate on what's important in texturing: creativity. Everything that took up so much time with 2D texturing is now done by BodyPaint 3D and you can deliver your projects faster. Let's move to the user interface (BodyPaint 3D is a component of CINEMA 4D and can be activated by simply selecting BodyPaint 3D from the CINEMA 4D Layout menu at the top right of the GUI).

2. General Information / Interface

First take a look at the screenshot below:



Here you see one of the two standard layouts: BP UV Edit. The second layout (BP 3D Paint) is set up in a similar fashion, only without the UV-mesh editor window which gives you more room in the editor window to paint.

1. Viewport

Here you can see the object you will be painting. You can rotate, move and zoom the window as needed. The RayBrush mode lets you paint directly onto the object in the rendered version of the view. This gives you control over the amount of color applied and can see right away how a new color looks on the object.

2. Texture Window (UV Mesh Editor Window)

This is where you edit your UV-mesh. You can relax and restore your UV-mesh. If you use the UV-Manager's UV-tools you can watch how the texture relaxes. You can also watch the color application process in this window, which will then be visible in the editor window right away.

3. UV Manager

The UV-Manager lets you restore the UV-mesh using an algorithm. It recognizes layered polygons and attempts to relax the UV-mesh for optimal placement over the entire surface and, if necessary, new placement. All remaining relaxation can be adjusted manually.

4. Attribute Manager Window

Different tabs display different brush types and their respective attributes as well as the UV Manager's UV tools.

5. Object Manager, Material Manager and color settings

The Object Manager, Material Manager and Color Manager are tabbed in the lower left corner of the interface. As in the standard layout, the Object Manager displays all the objects in your scene.

The Material Manager in this layout has expanded functionality, allowing you to manipulate individual material layers and paint on multiple channels at once.

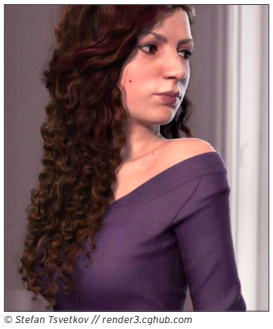
Within the Color Manager, you can set up the color or texture that you'd like to paint within each channel.

6. Icon Palette

The command palette contains the Paint Wizard, the Projection Painting and many other tools (that you're probably used to using with 2D paint programs). The BodyPaint 3D Wizard eliminates the need to manually create a texture including the UV-mesh. It also calculates the texture size and channels. Without these bothersome preparations you can begin painting right away.

3. Sample Images

We've reached a part of the tutorial for which words are not necessarily needed. Simply take a look at the following images.



© Stefan Tsvetkov // render3.cghub.com

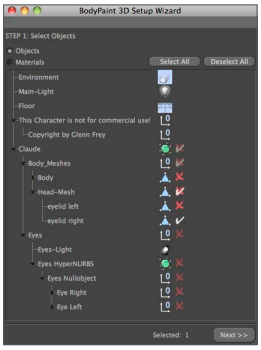
© Nicola Pireddu - www.kinopatia.com

© Stefan Haberkorn - www.vi-3d.de

Now we'll get to the heart of this tutorial. Open the file QS_BP3D_Start.c4d. Say hello to Claude, our guinea pig for the day. In the course of this tutorial we will alter the color of his right eyelid a little and apply a Bump layer to give a more elephant-like look to his skin.

Select the predefined standard layout BP UV Edit at the top right of CINEMA 4D's main editor window. Click on the BodyPaint 3D Wizard Icon so we can make the necessary preparations to the texture (brush symbol with white stars).

Click on Deselect All in the window you just opened and apply a white check mark to the eyelid right object only.

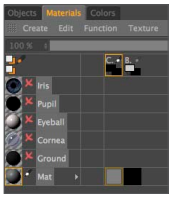


We have just determined that a texture should be created only for the right eyelid object. Click on Next. Leave the settings in the next window the way they are. The selection Single Material Mode would create a texture for each object individually. If the box is checked all objects will share one texture surface. Click on Next again. In the next window check the Bump channel. The Color channel is selected by default. You can double click the little gray boxes next to each texture channel and assign each channel a base color.

Since Claude likes elephant gray we will leave the boxes the way they are. Leave the rest of the settings the way they are and click on Finish, then on Close in the next window. The basic textures have been created and we can start painting. If you have experience with earlier texturing methods and the time it took to even get started BodyPaint 3D will seem like a blessing to you. BodyPaint 3D saves you a lot of time. Now let's move to the second part of the tutorial: the UV-meshes and the first brush stroke.

4. Quick Tutorial – First Painting Lesson

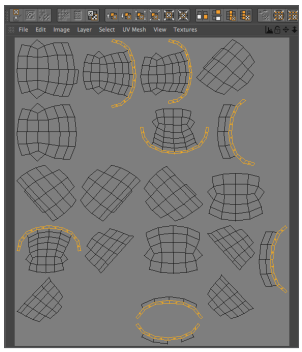
At the bottom left of the Material Manager (in the Materials tab) you will find the textures we just created, right next to Mat.



This is the default name for a new material. Of course you can rename the material if you like. The first texture is the color layer and the second is the Bump layer (at the top of the window you will see the abbreviations which refer to these layers – C for color and B for bump).

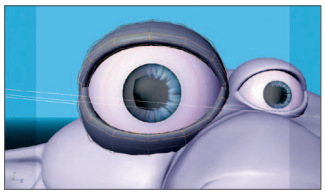
Now Select the Use UV Polygon Edit Tool symbol.

Once you have selected the corresponding texture in the Color channel the UV-mesh should become visible in the texture window at the upper right. If the mesh is not visible, activate it by clicking on UV Mesh / Show UV Mesh in the texture window menu. Luck is on our side! Fortunately, the default UV mesh looks pretty good. The only problem is that the UVs corresponding to the eyelids (highlighted in orange in the next image) are too small.

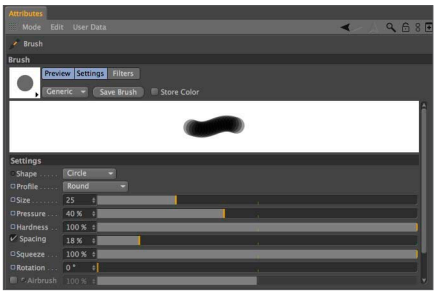


The individual UV-mesh polygons of these eyelid edges take up less texture area than the rest of the polygons. That's why a texture placed into the Bump channel appears larger in these places (photograph of elephant skin, for example). We can do without this, though, since we are painting our own skin structures onto the surfaces and not using an existing texture. We can counter any distortion we encounter when painting manually by using Projection Painting. The stroke will maintain its width no matter how the polygon is spread over the mesh.

Move and zoom the editor window view until Claude's right eyelid fills the view.

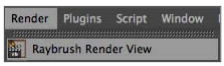


Now select Brush Tool for Painting Textures for applying the color. Set the size to 25 and the Pressure to 40 in the brush's Attribute Manager...



...and select a pink color in the Color Manager.

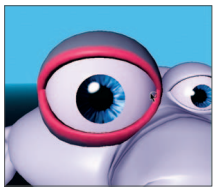
If necessary, increase the HyperNURBS subdivision for the Viewport because the eye image has a very low resolution without HyperNURBS. Activate the Raybrush Render View for RayBrush Painting in the active view in the Render menu (BodyPaint 3D main menu).



This will render the view and makes it possible for you to control the color application and the look of the strokes for the final rendering).

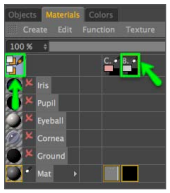
Activate Projection Painting (so you can paint without distortion and across any UV seams) and start painting. Of course BodyPaint 3D supports the use of graphic tablets such as a WACOM Intuos. Painting objects with a pressure sensitive pen on a graphic tablet is much easier than painting with a mouse.

Paint along the edge of the eyelid. The eyelid will probably end up looking like this:



If you move / rotate the figure now or click on the Apply the Content of Projection Paint Plane (click and hold on the Activate/Deactivate Projection Painting button)

you will see how the color was applied to the texture (you can see the recently applied strokes of color in the window to the right).



You can take the same steps for the Bump layer. We will take you one step further, though, in order to be able to explain an important function. We will paint both layers at the same time! Select the texture in the Color channel of the Material Manager. Now click on the icon with the black/orange pencil at the left of the Material Manager. Select the pencil icon next to the B of the Bump channel as well.

You have now told BodyPaint 3D that you want to paint in both layers at the same time. If you like you can switch from the standard BP UV Edit layout to the BP 3D Paint layout. This gives you more room to work in the editor window.

Rotate the view so you can see the eyelid from the top. Activate the Raybrush Render View for RayBrush Painting mode and set the brush size to 10. Switch to the color layer's Color menu and set the color to a medium gray which will be the base color for our eyelid. Now go to the Bump layer's color preview and set the color to black (both color layers are located in the Materials tab under the letters C and B + pencil symbol). When you paint on the object you will notice that both colors are being applied to the object – the gray base color and the black (to indicate indentations).

If white were the color of the Bump channel it would raise the brush stroke instead of indicating indentations. The result could look like the following image.

Load the QS_BP3D_Final.c4d file and take a look at it when you have time. Here are some everyday tips with which you can achieve great results quickly and easily.

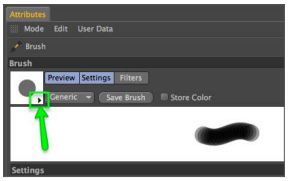
5. Tips & Tricks

A very helpful function can be found in CINEMA 4D's preferences (Ctrl+E). In the BodyPaint 3D menu you will find the function Project On Invisible Parts, which, when activated, allows you to paint on both sides of an object in projection paint mode. Let's assume you want to color the arm of a figure or sprinkle color on the entire figure. With this function deactivated you would have to apply the color with this function deactivated, rotate the arm, apply the color, rotate the arm and, well, you get the idea. When this function is activated you apply the color in the front view and the color is applied to all surfaces lying behind this surface at the same time. Just make sure you don't apply color to objects you don't want to color when this function has been activated.

If a texture map does not fit correctly at the point where large and small polygons meet (in the case of low-poly objects that are subordinates of HyperNURBS) set the Tile UV's function, in the respective HyperNURBS Object's Attribute Manager, from Edge Standart to Boundary to Edge. This sends the UV-mesh through the HyperNURBS algorithm and subdivides it to fit the polygon object.

Avoid UV-mesh polygons that meet to a point when applying a noise texture to a Bump layer. The narrower a 3-sided polygon becomes, the coarser the bump noise channel will be rendered. Of course such a polygon has much less area for the noise structure at its tip than it does at its center which results in a magnification effect of the noise structure.

Try to set up each side of a triangulated polygon as an isosceles. This also goes for 4-point polygons when they converge into a trapezoid. The more square the polygon the more even the structure will be. It goes without saying that you need different brushes for different texture looks. CINEMA 4D has a wide variety of brush types for you to use. Just select the tab Attributes and click on the small arrow on the brush preview.



Here you will find a wide variety of preset brushes corresponding to natural media and detail effects. You can also load preset brushes from Adobe Photoshop, and save your own brushes. Just make the changes you want and click on the Save Brush button.

Now that you've gotten a brief introduction to BodyPaint 3D's painting tools, you can experiment and practice adding details to your own models.

© frank-will.com

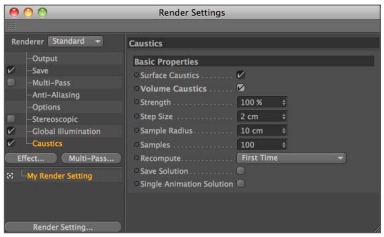
CINEMA 4D Renderer

This is the Quickstart Tutorial for the CINEMA 4D renderer. It will show you many of the CINEMA 4D renderer's typical applications and covers some theoretical physics behind the effects.

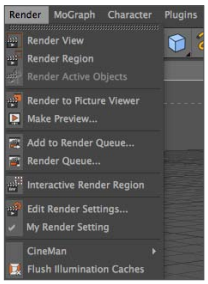
1. General Information / Interface

As soon as you open the Render Settings (main menu: Render / Edit Render Settings...) you will find parameters such as Global Illumination by clicking on the Effect... button. If Global Illumination is enabled, other options will be made available, which allow you to create custom settings for radiosity. A material's illumination settings are closely associated with the render settings. These settings let you determine if a particular material should be rendered with Global Illumination. Further settings can be applied to individual objects using the Compositing tag.

Caustics (available in CINEMA 4D Visualize and Studio) acts in a similar fashion. The global settings can be found under render settings. Here you can activate or deactivate surface and volume caustics separately. In addition, caustics also offers a third setting. You will find this in the light object. The use of caustics requires at least one light object. Within a light's caustics menu it is possible to determine whether the light source should generate surface or volume caustics.



Depth of field, highlight and glow are additional post effects available in CINEMA 4D Visualize and Studio. You will find them in the Render Settings under Effect. Further settings for depth of field can be made in each camera's attribute settings. A post effect will first be calculated after an image has been completely rendered. You can imagine it as a layer which is placed on top of the image after it has been rendered.



Use the method with which you feel most comfortable. Often we don't necessarily want to render the complete editor view but only a small part of it. This is also no problem. Select Render / Render Region. The cursor will be transformed into a cross. Drag a frame around the region you wish to render.

The second possibility is to render only a single object. Select the object Master in the Object Manager. Select the command (Render / Render Active Objects).

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2. Quick Tutorial – Rendering

You've been a busy bee. You have created a scene, set up the lighting, animated objects and assigned materials to them. Now we want to see the result of all this work. What you have to do is to transform this 3-dimensional scene into a 2-dimensional image (in the case of an animation it would be an entire series of images). We will render the images. Open the file QS_Render_01.c4d to work through the following tutorial. CINEMA 4D offers a wide variety of options for rendering your 3D scene in a Viewport:

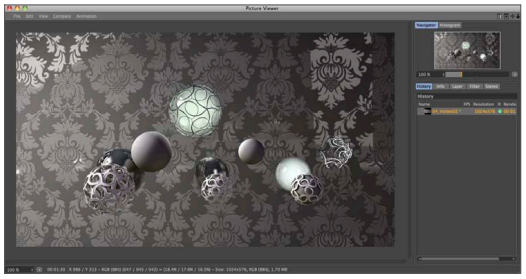
1. Using the main menu

2. The keyboard shortcut Ctrl+R

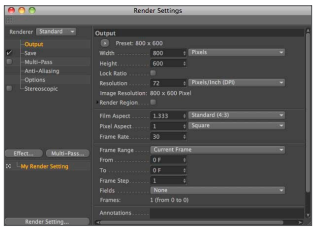
3. By clicking on the icon in the editor window (the clapboard farthest to the left)

Only the selected objects will be rendered.

Rendering the editor view gives us a quick overview of the scene but it does not offer the possibility to process this image further, to save it to the hard drive, for example. To save your renders or render a full animation, select Render / Render to Picture Viewer or press Shift+R. The picture viewer will open in a separate window in which the scene will be rendered. When the image has been rendered select File / Save As. A further window will open. Select the appropriate format and confirm with OK.

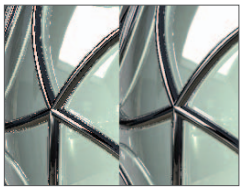


Of course you can also save a series of images as an animation. To do so, change the Frame Range from Current Frame to All Frames, and set Format to QuickTime Movie, for example. Rendering to the Picture Viewer has the additional advantage that you can continue working on your scene if the image should take a while to render.



You use the Render Settings (main menu: Render / Edit Render Settings...) to determine what our final image will look like. Size, quality, single image or animation can be set here.

If your rendered objects appear pixelated at their edges, this is a result of the anti-aliasing settings. This term refers to how smoothly an edge is rendered. Open the file QS_Render_01.c4d. In the Render Settings menu, set anti-aliasing to None and render the scene.



You can plainly see pixelation along the wire now as well.

Now set anti-aliasing to Best and render the scene again. All edges have been rendered much smoother without losing clarity.

To quickly check the scene you can leave the anti-aliasing set to None or Geometry. None renders the edges without anti-aliasing and very quickly. Geometry renders the image with sufficient smoothing and offers a good compromise between quality and speed. You can select the best quality when you render the final image. The Filter menu lets you select the type of anti-aliasing filter.

The parameters you modify/define in the Output and Save Render Settings menu depend on the requirements of your scene.

If, for example, you render a single image that will be printed with a resolution of 300dpi on an 8.5 x 11 inch page you should render the image with a resolution of at least 2550 x 3300. If you want to print the image in a picture size of 3x5 inches, a render resolution of 900 x 1500 will be more than enough.

For animation, the frame rate, which is also editable in the Output menu of the Render Settings, plays an important role in animation. The frame rate is the speed at which the animation plays. A frame rate of 25 means that 25 images per second will be played. If you produce an animation for the European market you will have to adhere to the PAL standard which uses an output size of 768 x 576 pixels and a frame rate of 25. If you produce a movie the frame rate must be set to 24 and a much higher resolution than for television.

3. Sample Images

Here you can see what the CINEMA 4D renderer can do!

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© Joe Yan (Shanghai IHDT) - www.ih-dt.tv

© CreativeDirection Dinko Lacic, MTV Production AixSponza GmbH

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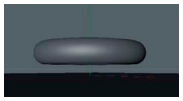
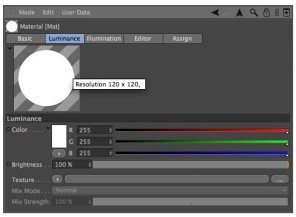
4. Quick Tutorial – Global Illumination

Light as we know it in the real world spreads on its own. It is reflected by the objects it hits. This differs depending on an object's surface characteristics. Imagine a room with a window on one wall. Light is being cast through the window onto the floor of the room. The light doesn't stop there, but is reflected from the floor onto other objects which, in turn, reflect the light themselves. The room is lit by diffused (indirect) light.

The raytracing procedure does not take into account diffused light. For example, if only one light is used, everything lying in the shadows will not be visible. Maybe you have already built a virtual room into which a light source is shining through a hole in the wall. The light in the virtual world hits an object, lights it – and that's it. The light spreads no further. Global Illumination rendering is different. Global Illumination rendering lets every object within the scene act as a light source. As you will see, you can actually light a Global Illumination scene without using a single light! Open a new (empty) file. Create a sky object (Create / Environment / Sky) and a floor object (Create / Environment / Floor). The sky object encompasses the entire scene like a large sphere. The floor surface is an infinite surface. Create a Torus (Create / Object / Torus) and move it to a y-position of 100, slightly above the floor.

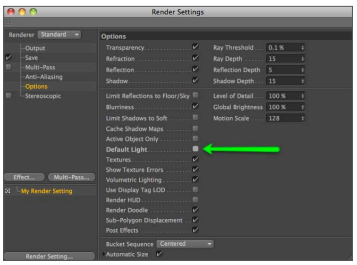


Now we will light the scene with diffused light using Global Illumination rendering. We will use our sky object as the light source. Switch to the Material Manager. Create a new material (Create / New Material; alternatively you can simply double-click on the Material Manager's gray field). Switch to basic in the Attribute Manager. Deactivate color and specular and activate luminance. Drag the material from the Material Manager onto the sky object in the Object Manager.

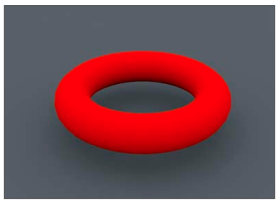


Create another material and give it your favorite color. Drag this color onto the torus.

The Luminance channel turns the sky material into a light source. Since the sky object spherically encloses the entire scene, it acts as a huge lamp which lights the torus from all sides. This effect will only be visible when we use Global Illumination as the render mode. Open the Render Settings (Render / Edit Render Settings). Click on the Effect... button and Global Illumination. Switch to the Render Settings' Options menu.

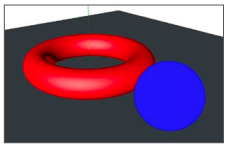


Rotate the scene in the editor so the view is at such an angle as to show only the floor in the background. This speeds up rendering since the rendering will only be done to the horizon. Render the scene.



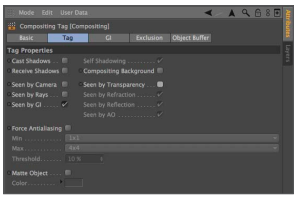
CINEMA 4D will automatically turn on Auto Light in a scene if there are no light objects present. When using Global Illumination, this automatic function is excluded since it would make the scene much too bright.

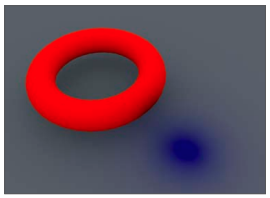
Create a sphere (Create / Object / Sphere). Move the sphere along the X-axis a little to the right and a Y-position of 100 until it's next to the Torus. Copy the sky material (CTRL + drag into the Material Manager) and switch to the Luminance channel of the new material. Use the color sliders to create a bright blue. Drag the material onto the sphere.



We now want to use the blue sphere as a light. We don't want the sphere to be visible, but only to emit its blue color. You achieve this by using the Compositing tag.

Apply a Compositing tag to the sphere in the Object Manager (Tags / CINEMA 4D Tags / Compositing). Switch to the Attribute Manager and deactivate all options except Seen by GI (Global Illumination). Render the scene.





You will see that a blue light is being cast on the torus and the floor. The blue sphere is not rendered because we have made it invisible using the camera's Compositing tag.

5. Tips & Tricks

Rendering often requires you to make a choice between speed and quality. Especially scenes using Global Illumination or Caustics can take a long time to render. This is why we recommend that you experiment with the Parameters and to initially use low values. For example, set the Global Illumination Diffuse Depth value to 1 to begin with and make a test render. If the illumination provided by GI is still too dark, increase the Diffuse Depth value gradually until you achieve the desired result. However, avoid raising this value above 4 since this will increase your render times enormously!

Make generous use of Compositing tags. This makes it possible to reduce the exactness of the rendering, thus reducing rendering times greatly. As you already know, CINEMA 4D allows you to animate effect parameters so that you can make changes to them at any time. Imagine caustics that change as you wish or the focusing of a camera.

Load a bitmap image in place of a color into the Luminance channel of a material that you use to illuminate a Global Illumination scene. The objects will then be lit with the colors of the image. This looks especially good if you use HDRIs. HDRI is an image format that contains special image luminance information and is thus an excellent choice for this effect. You can find information about HDRIs online. You can pep up your scene even more with the post effects Highlights and Glow. Using highlights you can give your material's highlights any form you wish, like a star, for example. Glow does just what the name says – it lets a material glow. Try it!

6. ProjectionMan

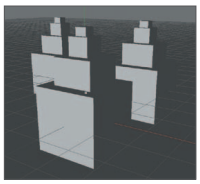
Once you have completed this tutorial you will be able to save a great amount of working time and maybe even create scenes you never would have been able to without this tool. This tutorial is primarily geared towards matte painters but can also be used by any 3D artist to keep from having to texture a great number of objects. For those of you unfamiliar with the term matte painting, here is a brief description of what this is: Matte painters mostly work in the movie industry and create (paint) background imagery for movie scenes. These backgrounds are for the most part so realistic that the viewer assumes they are real-world backgrounds. An example of matte painting is a scene in which a king on his horse rides across a virtual landscape that, on the one hand, does not exist in the real world and on the other hand does not have to be built in 3D. The matte painter paints the desired background and the king and his horse are simply composited into the scene.

Advancing technology has also made it possible to create matte paintings in 3D using a computer, which makes it possible to animate a camera and maintain a correct angle of view of the background. This would not be possible using traditional 2D techniques. The disadvantage (if you can call it that) to using 3D matte painting is that a single image cannot be used – the scene must be modeled and all objects must be textured. And this is exactly where ProjectionMan comes in.

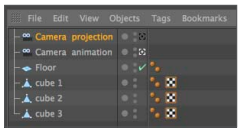
Let's say you have a scene with a city containing hundreds of buildings. Instead of having to texture each one of these buildings all you have to do is create one or maybe two matte paintings and project it correctly onto the scene. You define the camera's position and start ProjectionMan that in turn calculates the location of the geometry and starts Photoshop. In the image that opens in Photoshop or image application you can now paint from the angle of view of that CINEMA 4D camera. When you have finished painting, save the image in Photoshop and reload it in the corresponding material channel in CINEMA 4D.

Done! ProjectionMan will now project your painted image onto the geometry of that object (or even several objects) in real-time. Sound complicated? Then let's work through the following tutorial together and you will see how this tool can free up valuable time for many artists around the world!

Open the file, QS_PMan_Start.c4d



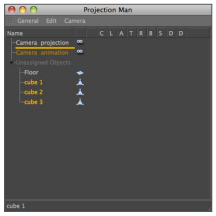
This is a very simplified version of a city scene in which a camera is animated to move in slightly to the buildings. Play the animation once (small green arrow below the Viewport). You can see how the angle of view changes. In traditional matte painting we would have a simple zoom in which the angle of the front building would not change in relation to the others. Our buildings, however, still need to be textured. Each building could be textured individually (which would normally not be much work for just three objects) or you can use ProjectionMan (e.g. if you had five hundred buildings staring at you waiting to be textured). Our scene contains two cameras. In order for ProjectionMan to be able to open Photoshop, the correct path to the Photoshop executable file must be entered in CINEMA 4D. Open the CINEMA 4D ProjectionMan preferences menu (main menu: Edit / Preferences / ProjectionMan). Enter (or navigate to) the location of the Photoshop.exe file on your computer. Let's take a closer look at our scene.



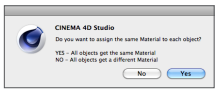
The first camera (Camera projection) is the camera that ProjectionMan will use to project a painted image onto the surfaces of the buildings.

The second camera (Camera animation) is the camera through which we just viewed the animated approach to our buildings. We must now let ProjectionMan know which objects it should use for the projection. And this is how it's done:

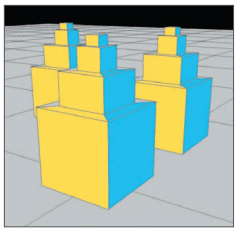
Make sure you return your animation to frame 0. Select Window / ProjectionMan from the main CINEMA 4D menu. In the window that opens, select all three cube objects and drag them onto the Camera projection object above (same window). Select Coverage Render from the selection menu that opens.



Enter the location to which you want to render the .psd file and click on OK. Confirm the prompt that follows with Yes.


CINEMA 4D Studio
Do you want to assign the same Material to each object?
YES – All objects get the same Material
NO – All objects get a different Material
No
Yes

CINEMA 4D will now automatically start Photoshop and will open the rendered ProjectionMan image. You can either start painting in Photoshop right away or create a new layer and create your matte painting. In order to get to know how ProjectionMan works, edit your own image to look like the one below. Of course you can use your favorite colors if you want.

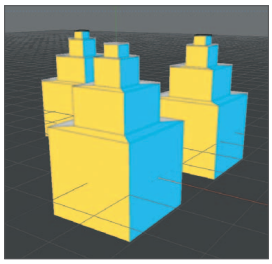


After you have finished modifying your image in Photoshop, save the image. Use the current name and location – otherwise CINEMA 4D will not be able to locate the image!

Return to your ProjectionMan scene in CINEMA 4D. In the Material Manager, at the bottom left of your interface, you can see that ProjectionMan has automatically created a new material. Double-click the material and switch to the Luminance channel in the window that opens.

Tip: ProjectionMan creates the texture automatically in the Luminance channel. This ensures that the scene remains completely unaffected by lights. After all, the scene is supposed to assume the color and brightness traits of your painted texture. This, however, can be changed by either deactivating the material's Luminance channel and loading the .psd file into the Color channel or by changing the ProjectionMan default settings in the CINEMA 4D preferences menu so the .psd file is automatically loaded into the Color channel.

We are now in the material's Luminance channel. Click on the small triangle next to the Texture parameter and select Reload Image. This updates the texture and includes the changes we just made in Photoshop. Now close the Material Manager and your scene should look like this:

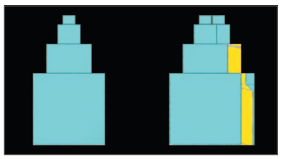


Play the animation. As you can see, ProjectionMan projects the texture correctly onto all three buildings throughout the animation – and that without having to texture each individual object.

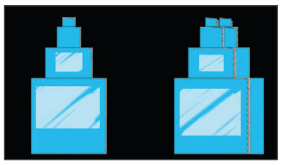
Now we will take ProjectionMan a step further and add a few windows to the side of our buildings. Normally, painting windows onto the surfaces at these angles would be quite difficult but all we have to do here is add a camera to project the desired image information onto the correct surfaces.

We will point this camera frontally at the light blue surfaces (side view). To create the camera, switch the Viewport to the Right view (Viewport menu: Cameras / Right) and center the view if needed. Create a new camera (main menu: Create / Camera / Camera). Rename the camera Camera right in the Object Manager (double-click on its name). Switch to this camera's view by clicking on the + symbol next to its name.

Again open the ProjectionMan window (main menu: Window / ProjectionMan) and drag Cube 1 and Cube 2 onto Camera right. Select Coverage Render and confirm all prompts with Yes. The newly rendered image will also be opened in Photoshop.



Edit the image to look (more or less) like the one below:



Save the Photoshop file, and return to CINEMA 4D. Again a new material has been created, this time with the name, PMat Camera right. Double-click the material's icon and reload the image in the Luminance channel. The texture will be updated in the Viewport immediately and the windows are projected correctly onto the objects. Play the animation.

You now know how easy it is to texture a scene using ProjectionMan, even without prior knowledge of 3D texturing. If needed, more cameras can be added and used for projection in order to create longer and more complex camera animations or to compensate for areas that may not have been mapped by another camera. As you saw in our example, all you need for a simple zoom animation is a single view and a single painting. If the camera were to move from left to right you would most likely have to create a matte painting for the start and end positions of the animated camera. In any event, ProjectionMan saves you from having to texture all 15,876 buildings in a single city!

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Sketch and Toon

This is CINEMA 4D's Quickstart Tutorial for Sketch and Toon. Sketch and Toon is included in CINEMA 4D Visualize and Studio. This tutorial will introduce you to some of this renderer's fantastic creative possibilities.

© Sebastian Storz s.storz@blattform.org

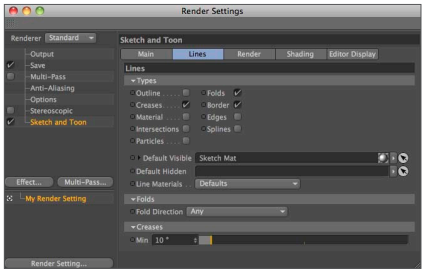
1. Introduction

Sketch and Toon belongs to the NPR family. This is an acronym for Non-Photorealistic Renderer and simply means that it's not the renderer's intention to generate highly realistic images but to do exactly the opposite: To generate images that look like they were created using traditional animation techniques. Do you want your scene to look like a technical blueprint or maybe a pencil sketch? Do you want to give your animated characters that traditional animation look? No problem for Sketch and Toon!

Sketch and Toon is very easy to operate. For instant results you can fall back on one of the many presets Sketch and Toon provides. Otherwise you can have a ball with Sketch and Toon's different settings. You will quickly realize that Sketch and Toon is a very powerful tool that offers limitless possibilities. You can take influence on practically any imaginable parameter. This gives you a cornucopia of render styles and you will never break the boundaries of Sketch and Toon - we promise! If you want to get a taste of how you can metamorphose your images just skip ahead to our gallery.

2. General Information / Interface

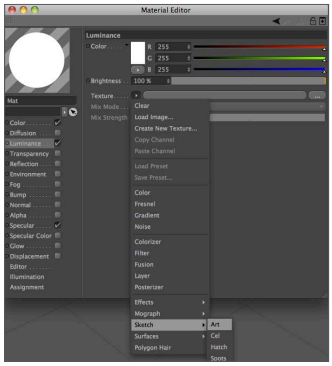
Sketch and Toon is a render effect. As you would expect you can find its settings in the Render Settings (Render / Edit Render Settings). As soon as you have selected Sketch and Toon from the Effect button's menu a wide array of settings is put at your disposal. These parameters let you determine the basic look of your Sketch and Toon renderings.



There's more. You will also find Sketch and Toon elsewhere within CINEMA 4D. Take a look at the Material Manager. A sketch material is created as soon as the Sketch and Toon effect has been activated. This is a material especially for the depiction of contours in a Sketch and Toon rendering.

You will also see that there are many more settings in association with this material in the Material Manager. These settings are global and affect the entire scene.

Keep this general rule in mind: The sketch attributes in the Render Settings determine WHAT will be rendered (contours? Hidden lines?), and the material attributes determine how something will be rendered (Line width? Line color?). Of course not every object has to be rendered in the same style. You can create an arbitrary amount of sketch materials and assign them to different objects. This makes combining a pen drawing with a cartoon object no problem. After all, Sketch and Toon offers four Sketch Shaders. These can be placed into the channel of a normal material just like any other shader. We suggest you place them into the Luminance channel. These shaders work independently, which means Sketch and Toon does not have to be active. The shaders are: Art for effects such as oil or acrylic painting, Cel for a cartoon-like style, Spots for a halftone print effect and Hatch for cross hatching.



3. Sample Images

Here is a sample of the beautiful imagery you can create with Sketch and Toon.

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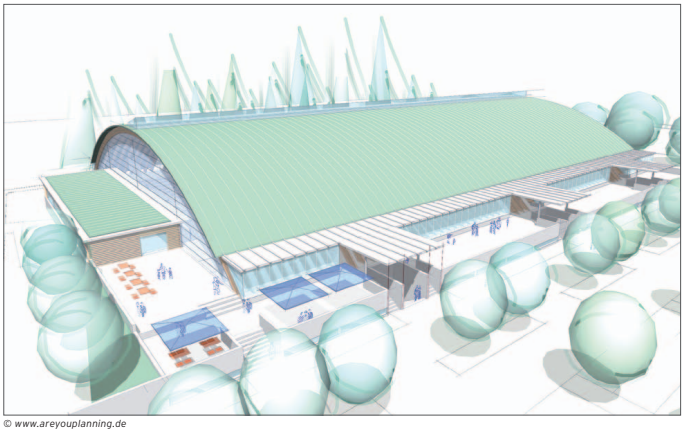

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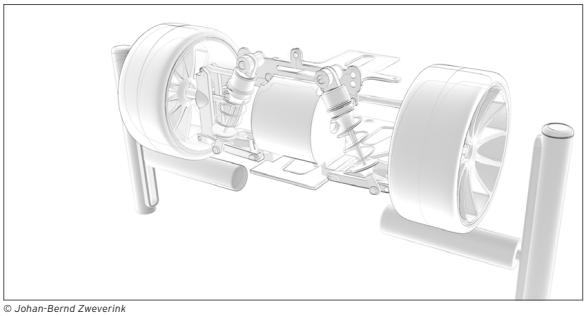

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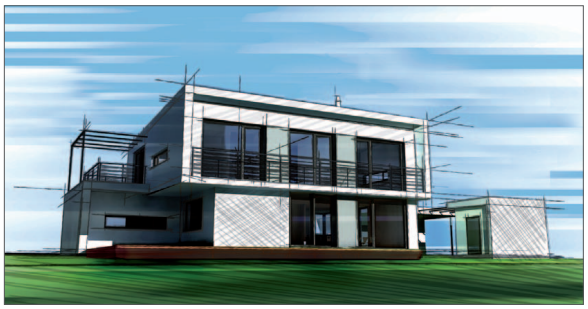

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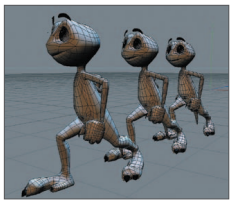
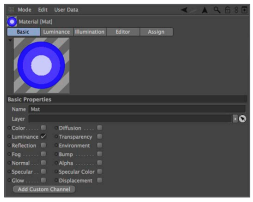
4. Quick Tutorial – Shaders and Tags

In this tutorial we will combine an object rendered in the sketch mode with an object rendered in the normal mode in the same scene. We will also examine the Cel shader, one of four special sketch shaders. Our goal will be to assign different render styles to each of three objects. The first object will only have a contour and it should look like it was hand-drawn. We will test the cel shader on the second object and give it cartoon-like colors. The third object will look like a normal CINEMA 4D object rendered with standard settings.

Open the file, QS_SaT_Start.c4d.



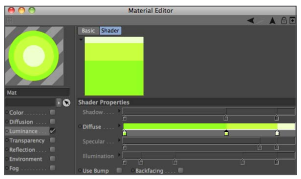
Create a new material in the Material Manager (Create / New Material). Deactivate the Color and Specular channels in the Basic tab of the Attribute Manager. Activate Luminance and switch to the Luminance tab. Click on the small arrow to the right of the word Texture. Select Sketch / Cel.



Tip: A material can also be edited by simply selecting (single click) it in the Material Manager. The material's settings will be displayed in the Attributes Manager at the right of the interface. This lets you avoid having an additional floating window open, which is the case if you double-click on a texture in the Material Manager.

The cel shader is a type of gradient shader. It can be loaded into any channel but for a cartoon-like look it should be put into the Luminance channel where its colors will always be rendered as full-tone and will not be influenced by the scene's lighting.

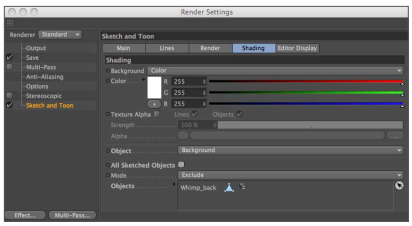
Click on Cel. The cel settings will appear. 3 shades of blue are preset here by default but they don't really match our figures. Double click on the color sliders and create three colors with a green hue.



The number of colors represents the number of color steps an object will be colored with. 1-2 colors is always good for a cartoon look. Drag the new material in the Object Manager onto Whimp_middle and render the scene.

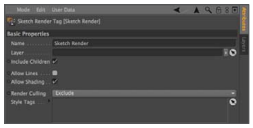
Our Sketch and Toon figure is standing between two normal rendered figures. It is not necessary, though, to activate the Sketch and Toon render effects in order to use a sketch shader. Now we will beautify the rear figure with a contour.

Activate the Sketch and Toon effect in the Render Settings. Switch to the Shading tab and select Background in the drop-down menu next to the word Object. Only the contour should be visible on the rear figure so we will set its Inner Color to the same as the background color. If we were to render the scene now the other figures would appear white as well so we will tell sketch that these settings should only apply to the rear puppet. Deactivate the All Sketched Objects parameter. Select Include next to Mode and drag Whimp_back from the Object Manager into the text field under the menu. The shading settings will now only apply to this object.



Select the Sketch material that was just added and in the Attribute Manager's Main tab, change Presets to Pencil (Soft Sketch). Render the scene.

Even though all figures have the correct filling each of the two front figures has assumed the contour style of the figure behind it. We will deactivate the contour rendering for these two objects completely. Select Whimp_front and Whimp_middle in the Object Manager and select Tags / Sketch Tags / Sketch Render. Deactivate Allow Lines in the Attribute Manager.



We've done it! Three objects, each with completely different render styles coexisting peacefully in the same scene.

5. Tips & Tricks

Sketch and Toon offers several levels of control. If you are taking your first steps with this tool and are a little overwhelmed by the countless buttons and sliders simply set the level of control to Easy (either in the Render Settings or in the sketch material attributes). Several functions will then be hidden. Once you feel more comfortable with Sketch and Toon (which shouldn't take too long after having completed this tutorial) you can move to the next level. The time it takes to render a Sketch and Toon scene depends on the size and / or complexity of your scene. If it takes too long, check for objects in the scene that can excluded from the rendering process using tags. Lowering the anti-aliasing quality (contour smoothing) can speed your rendering up as well. Make use of Sketch and Toon's flexibility. You can assign different styles to visible and invisible lines, just as you can assign a different style to individual objects in your scene. The combination of standard rendering and Sketch and Toon can result in especially spectacular images.

Use the countless presets, especially in the beginning, to give yourself a good working knowledge of Sketch and Toon. If you find a preset that you really like, examine it closely and see what all it can do when you apply your own settings. This is the best way to find out how Sketch and Toon ticks.

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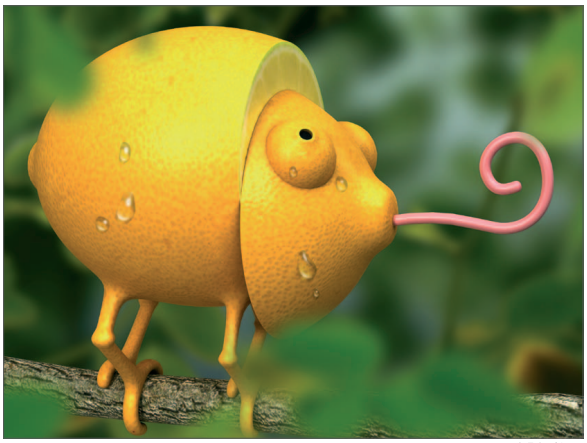

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Character Tools

This is the Quickstart Tutorial for the CINEMA 4D character tools, a collection of tools especially for character animation. CINEMA 4D includes a complete toolset for character animation. Many of these tools are available in all packages and some are available only in CINEMA 4D Studio.

1. Introduction

3D character animation is a complex subject. It not only challenges the software but the animator as well. Almost anyone can quickly create a character that moves in one way or another, but a convincing character animation requires quite a bit more work. The animator needs to know the theory behind character animation before he or she can judge whether or not the animation is good or bad.

So before we explore the character tools themselves we would like to quickly go over the 12 principles of character animation. These 12 rules were developed back in the 1930s by Disney animators and can almost be applied 1:1 to modern 3D animation. They are useful not only for characters but for just about anything you animate. Anyone who is serious about character animation should stick these rules to the ceiling over their bed (and get rid of whatever else that is up there now). A convincingly animated character will then be only a matter of patience.

Squash & Stretch – every organic object deforms in some matter when it is in motion. Squash and stretch is the exaggeration of this effect when a character is in motion.

Staging – is the setting up of an animation. This includes lighting, camera angle, effects and slow motion.

Anticipation – Expectation of a reaction to an action is known as anticipation.

Pose to Pose / Straight Ahead – these terms describe two animation techniques. Pose to Pose sets two important key poses and the time between is then filled. Straight Ahead sets one key after the next – straight ahead through time.

Follow Through / Overlapping – the impetus or the overlapping of movement of a body parts.

Ease In / Ease Out – an object begins to move slowly, reaches its top speed and slowly comes to a halt.

Arcs – In nature almost every movement is described as arcs, no matter if it's a swinging arm or the rotation of a head.

Secondary Action – movement that is created by movement of another object.

Timing – the speed with which an action is executed.

Exaggeration – can be used in many instances: Arms that are being stretched too long when a character is hanging from a cliff, eyes jumping out of their sockets to help demonstrate a shocked expression.

Appeal – a character's impression, look and nature.

Personality – like an actor, a good animator must be able to make his character express himself.

You can find more detailed descriptions of these rules online or in any good animation book. These rules might seem pretty extensive at first glance but the more you animate the more they will become your own flesh and blood. Every time your animation looks a little weird it will most likely be because you didn't follow one or more of these rules. Now we want to put these rules to use.

2. General Information

First, we will explain a few basics about character rigging in CINEMA 4D. CINEMA 4D works with a Joint system. Simply put, this system lets you assign joints and appropriate locations that will in turn be linked to the mesh and used to rotate and move your character. The mesh will follow the joints to which it is linked and the character can be animated. To be able to correctly move your character a rig consisting of controllers must be set up that serve as handles for the animator. This way not every individual joint of an arm must be moved in order to position the hand at the desired location - only a single controller has to be moved. There are additional character controllers and helpers for character animation. A few of them are explained below.

The Morph tag lets you create various facial expressions for your characters and morph between them. Your polygon object acts as the reference and a base morph (starting position for all following morphs) and target morph are created in the Pose Morph tag. You select the morph target in the Morph tag and change the mesh...finished!

You create another morph target for each additional pose and model the poses one after the other. All the expressions are stored in a single tag. Also, when using the Pose Morph tool, there's no need to worry if you have to make changes to the mesh after creating the poses. The poses will still work! Suppose you've created all the poses for your character, but decide it would look much better with a second nose. The Pose Morph tool will still happily morph between the poses.

Vamp gives you the possibility to transfer data from object to another, including selection information, Texture tags, vertex maps and UVs. You can even transfer facial poses from one character to another!

Visual Selector is a great help with day-to-day animation. You load a render of your character into Visual Selector's background (or use Visual Selector's default character picture) and place your character's controllers onto the picture in the appropriate places. Visual Selector removes the need to keep looking for your character's controls in the Object hierarchy. Everything is now represented visually and you can, for example, select the foot controller by clicking on it directly in the picture. You want to move the eyes? No problem. Click on the controller for the eyes directly in the picture.

You'll find the CINEMA 4D character animation tools in the main menu under Character.

Since character animation is a complex subject matter, the following overview may help if you're new to the process of rigging characters.

As with a real human, your character needs a skeleton of bones (or in our case, joints) in order to be able to move around in the world. You place the joints inside the character's mesh. The joints are linked to the mesh via a Weight tag and Skin deformer so that each joint knows which part of the geometry to affect.

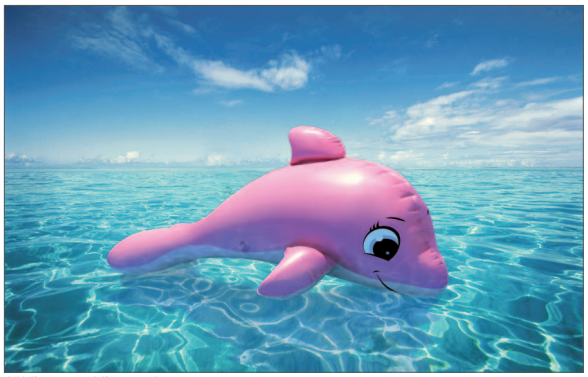
You can weight joints by selecting them and painting directly onto the mesh using the Weight tool. While the Weight tool is active, the mesh is displayed black and the currently painted weighting is shown in white. The joint now knows it should affect the white painted parts of the mesh only. In the active Weight tool mode, weighting is shown for the selected joints. Each joint has its own weighting.

The joints must be arranged into a hierarchy in the Object Manager in a similar structure to the bones in your own body. In real life, when you move your upper arm, the lower arm and hand move with it because they are effectively children of the upper arm.

Likewise, in CINEMA 4D's Object Manager, the elbow and wrist joints must be children of the shoulder joint. If you move the shoulder joint, the child joints will move with it together with the mesh weighted to the child joints – even though the shoulder joint is weighted to the upper arm only.

As previously mentioned, each child joint has its own weighting and moves the parts of the mesh not weighted to the shoulder joint.

Don't worry if this seems complex. The following tutorials will explain all this in detail.



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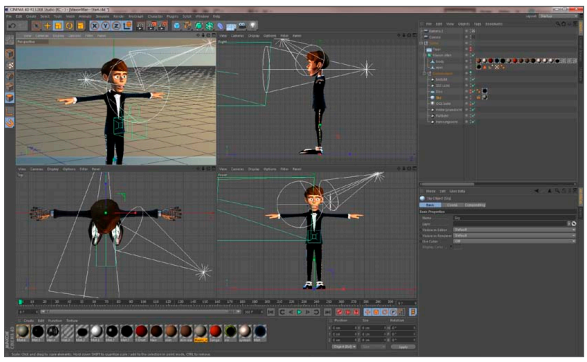
3. Working with the Auto Rigger and CMotion

Creating the Basic Rig

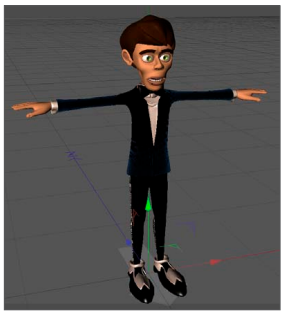
Character rigging for 3D animation is one of the most complex and difficult disciplines in the field of 3D graphics. There is still no one-stop solution available but with CINEMA 4D R14, rigging and animating characters is no longer a book with seven seals. Several new functions and tools have been added that make working with characters much easier!



Preparation

Start CINEMA 4D and make sure you are using the Standard layout for the GUI. Open the scene, MaxonMan.c4d, which contains the character mesh that we will rig in the course of this tutorial and animate using CMotion. To make working with the character easier we should hide all other objects in the Project. To do so, hide the Environment object in the Object Manager (click on the small circles next to the Environment object in the Object Manager until they are red). Now only the character will be visible in the Project. It's also a good idea to set your Viewports up so you have a front, side and top view of your character in addition to the perspective view. The Viewports have already been set up correctly for this tutorial so we can get started more quickly.

What we will do first is put the new character system in place. Select Character from the Character menu. A symbol with the same name will appear in the Object Manager. The newly created object will appear as a gray arrow in the Viewport.

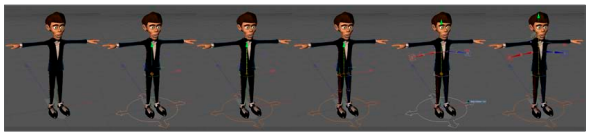


In the Attribute Manager you will see the Character object's initial settings. Numerous parameters are available here. When a Character object is created, its Object tab is active by default. This tab contains 4 menus: Build, Adjust, Binding, Animate and represent the 4 steps required to complete an animatable character.

Directly below these tabs is the Template selection menu in which you can select the type of character rig you want. You can select from Advanced Biped, Biped, Quadruped and many more. For this tutorial, select Biped. This will let you create the rig for a humanoid biped. The rig that we will use in this tutorial is well-suited for controlling (animating) a human character. More detailed rigs that offer much more complex control systems can be created using the Advanced Biped rig. The Quadruped option, for example, makes it possible to create a rig for four-legged creatures.

Selecting the Biped option hasn't yet done much with regard to creating a rig. Directly below the Templates options is the Components menu, which contains a Root button. Clicking on the Root button will generate a pelvis, which in turn will be used as the starting point for the entire rig. Once the Root has been created, another button will appear – the Spine (Fk) button. Clicking on this button will create a spine that is connected to the pelvis. Click on the arrow at the right and 2 options will be made available: FK (forward kinematics) and IK (inverse kinematics). Select the IK option. Additional options will be made available, which let you create a head, arms and legs.

Before we continue, lets take a look at our model in the perspective view. The parts of the rig that we have created are not scaled in line with the character model. They are far too small. This is not a problem at this stage because the adjustment and re-positioning of the rig's individual components will be done later, after all components have been generated. In the next step we will generate the legs. If you Cmd/Ctrl + click on the button, two legs will be generated.

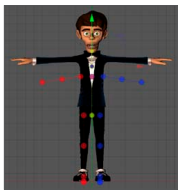


Note that if buttons for further rig components are not displayed, check in the Object Manager to see which component is currently selected. If, for example, you want to generate legs, the spine must be selected. If the pelvis is selected, you will only be able to generate a spine. Alternatively you can SHIFT+click to remain in the previous hierarchy.

Once the legs have been generated we will continue with the arms. Here you can also select between forward and inverse kinematics, plus an additional option, Limb. While the former two options generate arms with five fingers, the latter creates limbs with only upper and lower arm elements. To these you can later add fingers, be it 2, 3, 4 or five – or however many you want. For this tutorial we will only use upper and lower arm elements. Once you have added the arms, click on the Head button to add the head. This completes our rig.

Adjusting the Rig to Match the Mesh:

Let's have a look at what we have done so far: We have created a rig that contains all components needed for our character, only that the rig is too small. This is why we will now scale the rig to match our mesh. First, select the Character object in the Object Manager and switch to the Adjust menu in the Attribute Manager. The rig's appearance will change drastically in the Viewport: it will turn into a green, red and blue stick figure at whose joints are circles of the same color.



First we will position the rig relative to the mesh. Select the Root object in the Object Manager and use the Move tool to move it upwards until is centered on the character's pelvis. Don't forget to check the position in the side view to make sure the Root object is centered there as well. Use the Scale tool to enlarge the rig to match the mesh. Don't worry if individual components are too short or too long – we will fine-tune these as well. Once the rig roughly matches the mesh we can begin with the fine-tuning, which will be done using the Move tool. Start with the legs by clicking on the joint at the top end of the upper leg and repositioning it accordingly. CINEMA 4D automatically mirrors this adjustment on the other leg. Make sure to also check your work in the side view.

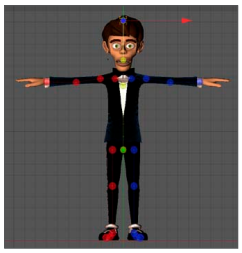
A tip for positioning extremities: Arms, legs and fingers/toes (if present) are structured hierarchically. If, for example, an upper leg is moved, the lower leg and foot will move accordingly. Therefore you should always make sure to work from the inside out or downwards in the hierarchy.

If you should want to subsequently move one of the higher-level points (e.g., the thigh), the subordinate points (knee, ankle, etc.) will automatically be moved with it. To prevent this from occurring, press the 7 key while moving the thigh, which will let you move the parent object without affecting the subordinate objects.

Continue positioning the rig down to the feet and make sure the feet point slightly outward. This can be done more easily from the top view.

We will now continue with the spine and the arms. The spine should not be placed towards the rear as in a real body but rather near the center. Next, position the shoulders and arms accordingly.

Another tip: Joints such as knees and elbows deform the character significantly when animated. Therefore, you must make sure that enough geometry is present at these locations in order to handle these deformations. On our character you will see that the knee and elbow regions have three polygon rings. Place the rig's corresponding joints at the center of these rings so the bones will have an optimal influence on the mesh. Furthermore, you should make sure that the knees and elbows have a very slight bend, as in reality. Polevectors are used for these joints internally, which define the direction in which the joint will bend. By slightly bending the knees and elbows, the final rig will be better adapted to the mesh.



Position the wrist next to the cufflinks. Six joints are located because this is where the fingers will be generated later. To locate the right joint, right-click on the wrist and select the right joint from the list that appears (...Hand_con+). Now we just have to adjust the fingers and the head and our rig will be ready to be bound to the character's mesh.

Binding the Rig to the Character's Mesh

Before you start binding the rig to the mesh it would certainly be a good idea to save your Project. After doing so, make sure that the Character object is selected in the Object Manager, i.e. that the rig is selected. In the Attribute Manager, switch to the Binding tab.

This will again change the appearance of the rig in the Viewport. It will again be made up of joints and bones. Double-check the position of the bones and joints before getting started. The Binding tab contains an inclusion field (Objects). Simply drag the polygon objects body and eyes from the Object Manager into this field. If you need to place multiple objects into this field you can do so by either dragging each object individually or by using the Object field's Start Pick Session function (click on the arrow in the white circle or right-click on Object field). Note: Do not click and release. This will display the selected object's attributes and the Bind function's Object field will temporarily be hidden. If this happens, select the character object anew.

Note: Do not place the HyperNURBS object into the Object field.

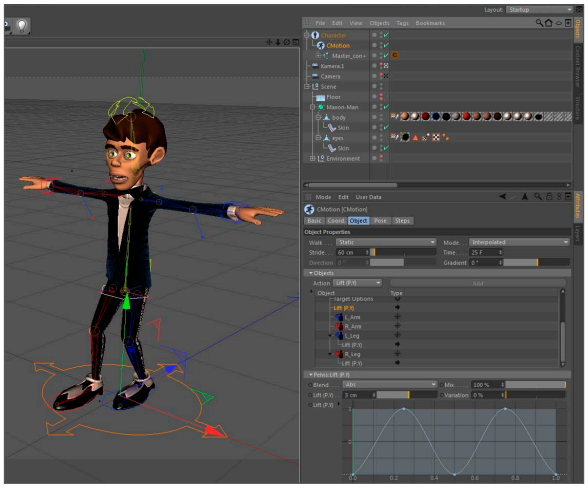
This more-or-less completes the binding of the rig to the character's mesh. However, before we move on to the Animation menu where we will actually move our character, we still have to complete one more important step. Don't forget that the rig that we just bound to our character's mesh is much more complex than it looks. Numerous bones, Null objects and Controllers are needed in order to make the rig behave correctly when animated. These have already been generated automatically by CINEMA 4D but are not visible. These components are actually irrelevant for the person(s) creating the animation.

Important for the animators are the Controllers. These Controllers represent virtual strings of a marionette – which our character de-facto is. Hence, we only need these Controllers to be visible. Too many elements in the Project would clutter up the view and slow your workflow.

You can modify the visible state of the rig's components in the Attribute Manager's Display tab. Select the Character object in the Object Manager and switch to the Attribute Manager's Display tab. Here you will find several options for displaying the rig's components. The Viewport options affect the character's rig in the Viewport and the Managers options define how the character's rig is displayed in the Object Manager. First, select Controllers from the Manager menu's Object Manager setting. Now only these Controllers will be visible in the Object Manager, i.e. the objects that are used to control the character.

Creating a Simple Walk Animation

We have now prepared our character so it can be animated. Select the Character object in the Object Manager and switch to the Object tab's Animate menu in the Attribute Manager. Click on the Add Walk button at the right. This will assign a CMotion object to the Character object, which lets you generate cyclical animations or movements such as a walk cycle. To do so, select the Character object's CMotion object in the Object Manager and take a look at its properties in the Attribute Manager's Object tab.



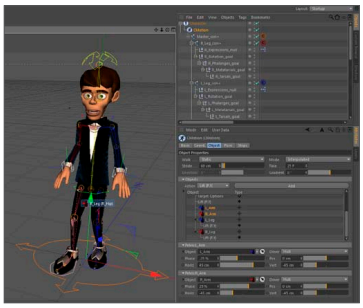
Set the Stride value to 60cm. Now turn your attention to the list of objects in the Objects menu below and select one of the legs (L_Leg or R_Leg) in the list. CINEMA 4D will automatically assigne a Lift (P.Y.) action to the legs in accordance with the previously selected template. A set of parameters will be made available below. In this case you will see the Lift function as a Child object of the L_Leg (or R_Leg). This is an Action that, as the name says, creates a lifting motion so the corresponding foot rises during the walk motion. Try it out by clicking on the green Play button (the green arrow just below the Viewport) and making your character walk in place and the feet will be lifted. If this action would not have been added automatically, you would have had to fine-tune this manually. Select the L_Leg object in the CMotion object's Attribute Manager and click on the Add button. Because the Lift function is defined as a default function, we did not have to select it separately. Add the same action to the R_Leg object.

Stop the animation, if necessary, and jump back to frame 0. Select the Lift (P.Y) parameter; its settings will be displayed below. Increase the Lift value to 10cm and don't forget to do the same for the other leg.

Alternatively you can right-click on the already modified parameter in the Object list and select Copy. Then select and right-click on the other leg and select Paste. As you can see, you have now copied the lift action from one leg to the other. If you play the animation again you will see that the character lifts its legs much higher than before when it walks.

You will find another Lift action in the Object list, which lies below the Root in the hierarchy. This controls the rising and sinking motion of the pelvis during the walk cycle. You may have already noticed that this motion is very sedated during the walk cycle. Set this parameter's Lift (P.Y.) value to 3cm and play the animation again. You should now have a more realistic pelvic movement. So far so good. Now we will continue with the arms, which are still stretched out to the sides and of course don't represent the natural position of a person's arms when walking. To reposition the arms next to the torso, select an arm in the CMotion Attribute Manager. Again, several parameters will be made available below, including Horiz. and Vert. These values affect the orientation of the selected arm or the Hand Goals of the respective arm to which the arm is oriented.

Set the left arm's Vert value to -45cm and its Horiz value to 45cm; set the right arm's Vert and Horiz values each to -45cm. Now both arms lie slightly bent alongside the torso. Next, we want to make the arms swing in tune with the walk cycle. So far we have only worked with Actions that were already included in the list. Actions are an integral part of CMotion. A character's movements are defined by the use of Actions and the fine-tuning of their parameters. Select an arm from the Attribute Manager's CMotion list and assign a Push (P.Z.) parameter to it. To do so, select the arm, then the parameter from the drop-down list and then click on the Add button next to the list. The Push (P.Z.) parameter will now appear in the list below the arm to which it was assigned. Select the parameter and set its Push (P.Z.) value to 30cm. Right-click on the graph below and select Spline Presets / Sin from the context menu. This replaces the straight line with a sinus curve.

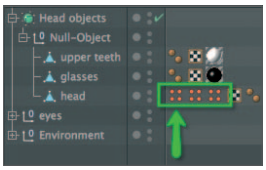


The Finishing Touches

Play the animation again and observe how the arms swing back and forth. We have created a simple walk cycle animation, which of course can still be fine-tuned quite a bit. Copy and paste the Push (P.Z) action to the other arm. To tone down the movement we have to modify one setting for the arms. Currently, each arm moves with the leg on its own side, which is far from a natural walk behavior. To change this, select the L_Arm object in the CMotion menu and set its Phase value to +25%. This will set this arm's phase to the exact opposite to that of the right arm. Change the Phase value of the R_Arm object to -25%, which will cause this arm also to have an opposing motion. You can, for example, make the character actually walk past the camera instead of having it walk in place. To do so, all you have to do is set the Walk parameter to Line or Path (which lets you move the character along a given Spline) in the CMotion's Attribute Manager's Object menu.

You can also fine-tune the character's gate, for example by modifying the Lift Action's sinus curve. This curve defines now far the feet rise and fall. Currently, the curve is smooth, which causes the feet to also rise and fall smoothly. If you move the crest of the curve to the right near the end of the curve, the character will walk with a more stomping motion.

You can also add Actions. You can, for example, assign Tilt and Rotate actions to the Root and set their respective values to 4°. This will make the gate more natural. You can also begin modifying the character's characteristics much earlier by fine-tuning the character's weighting during the binding process via the Weights Manager. You can ensure a more accurate deformation of geometry at the joints by adding a Smoothing parameter, or you can add a Muscle parameter to make muscles bulge. All of the available parameters and options can be used to fine-tune your character's motion and characteristics until you have an ultra-realistic animation.



The pre-defined points will automatically be selected and CINEMA 4D will automatically be switched to Point mode. In our example, the points that affect the eyebrows will be selected. Move these points downward, slightly to the rear and rotate them slightly (To drag the eyebrows farther down for a "mean" look, the points at the end of each eyebrow must be deselected and each eyebrow rotated separately. For our tutorial, however, we can simply drag all points downwards simultaneoulsy.). If the eyeglasses get in the way, simply turn off their display in the Object Manager. When finished, your object should look like the one below:

Tip: The axis orients itself according to all selected points as a whole, which can lead to unwanted rotations. Hence, it is sometimes easier to use the World axis when rotating selected points. To do so, select the desired function (Move, Scale, Rotate) and set Axis to World in the Attribute Manager's Modeling Axis tab.

With the Pose Morph tag selected, click on the Add Pose button in the Attribute Manager to define additional poses for the mouth and tongue, for example (these points are also pre-defined in the Object Manager). Simply double-click on the respective icon (with four orange dots).

4. Quick Tutorial – Pose Morph

The Pose Morph tool is a powerful tool for mixing Joints, points, UVs, parameters, User Data and much more by morphing between states (e.g. size, position, rotation) using sliders. Using Pose Morph is as easily as it is logical.

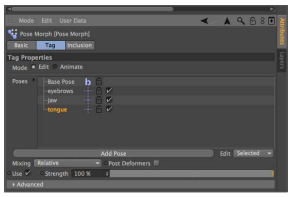
Open the file QS_Maxon_Head_start.c4d.

We will use Pose Morph to change the facial expression of our friend in the image above from friendly and unassuming to consternated and silly.

Right-click on the Head object and select the Pose Morph tag from the Character Tags menu. Select the tag in the Object Manager and activate the Points option in the Attribute Manager. An initial Pose (Base Pose) will automatically be created. The Base Pose (displayed in the Poses list) is the state in which the points are positioned at the moment the Pose Morph tag was applied. This list element should not be modified because it represents the initial state for all subsequent morphs - all morph poses will reference this initial state. Therefore, make sure this element is not selected (active) when modifying the object.

To start modifying the object, select the element Pose.0. Normally you would have to switch to the Point tool but we have already taken care of this step for you.

At the right of the Head object in the Object Manager are three tags, each with four orange dots. Double-click on the tag farthest to the left.



Once all poses have been defined we can begin mixing the poses. In the Attribute Manager, set the Mode option from Edit to Animate (Tag tab). The Pose Morph tag's options will change automatically and you can define the strength with which the poses will be mixed using the Strength value. All morph targets are animatable.

5. Tips and Tricks

• To create Joint poses with Pose Morph all you have to do is add a Pose Morph tag to the top-most Joint and enable the Rotation and Hierarchy options. You can then rotate the Pose Target's Joints without modifying the Joints' original position.

• The joints of the fingers of a hand only need a single Pose Morph tag with an enabled Hierarchy option. Simply create a new Pose for each finger pose. This lets you keep the Object Manager more organized because all Poses for a single hand will handled by a single Pose Morph tag.

• You can use the Driver tag to control Poses automatically. Assign the Driver tag to the Joint and link a Pose directly to a specific rotational direction of the Joint. This can, for example, be used to simulate the flexing of muscles when an arm is bent.

• If you want to use a specific Pose as an initial state you can right-click on the desired Pose and copy & paste it accordingly.

• If you want to convert a Pose into a polygon object outside of the Pose Morph tag, right-click on each Pose and select the To Mesh command.

• Make sure not to disable options previously enabled in the Pose Morph tag's Basic tab (e.g. Points, Rotation, etc.). This will delete all defined Pose Morph Targets. Enabling these options again will not restore these Targets.

• To avoid accidentally modifying the initial pose, right-click on the Pose, select the Lock command from the menu. Alternatively you can click on the lock icon next to the element in the list.

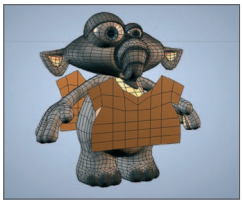
© Jana Rot, www.rot.si

6. Quick Tutorial – Cloth

CINEMA 4D contains a very powerful Cloth engine. You can use this tool to let a flag flap in the breeze or to give your character a snappy T-shirt. This is exactly what we want to put on Claude.

What's nice about the Cloth engine is that it's not necessary to go through the trouble of modeling a T-shirt. All you have to do is create the front and the back of the shirt. The integrated algorithms will make the garment fit automatically.

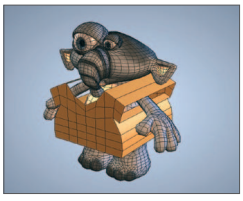
Open the file QS_Cloth_Start.c4d. This file already contains both T-shirt halves as a single object.



If you don't like the shirt feel free to replace it with your own creation. As you can see it was created with very few polygons. The simplest method of closing the edges of the T-shirt is to switch to the Use Polygon tool and select all of the shirt's polygons (Cmd / Ctrl + a in the Viewport). Then activate the Bridge tool and disable the Delete Original Polygons option in the Attribute Manager. Now click on one of the rear polygons, whose edges will then be highlighted. Keep the mouse button pressed and drag the edges towards the front polygons, whose edges will then also be highlights.

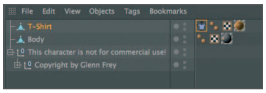
Once the mouse button is released, all the polygons necessary for connecting the halves will be created. Just make sure that the corners are connected correctly. Otherwise the polygons will be connected incorrectly.

You can now delete the superfluous polygons (neck opening, sleeves, waist).



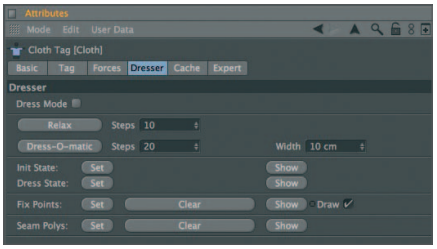
The shirt needs to be subdivided a little more so you can deform it better later. Switch to Use Polygon Tool mode and select the polygons on the front and back side of the shirt. Select Mesh / Commands / Subdivide from the main menu. Make sure you don't subdivide the polygons on the side (the ones created by the bridge tool). OK, it doesn't really look like a T-shirt yet, it looks more like a box with sleeves. But don't worry, we're going to change that right now. The Cloth engine is very easy to use. Most functions are contained in one tag, the Cloth Tag. It will be assigned to the object, which will then be turned to cloth!

Right-click on the shirt and select Simulation Tags / Cloth. The Cloth engine's properties will appear in the Attribute Manager.



If the cloth object is to collide with another object, as is the case with the T-shirt and the body, the other object must be assigned a collision tag. Select the character's body (polygon object Body) in the Object Manager with the right mouse button. Select Simulation Tags / Cloth Collider.

Now the T-shirt knows that is should not pass through the character. It's about time that we gave the shirt its proper shape. Select the cloth tag and switch to the Dresser tab.



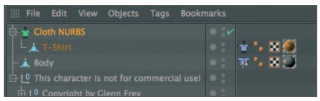
In the dresser tab you will find everything you need to make clothes fit. The other tabs deal with the cloth's behavior. Select Set next to Dress State. This is like a security measure. We can recall the shirt's initial state in case we don't like the position of the shirt or if we want to add a breast pocket, for example. Switch to Use Polygon Tool mode and select the polygons on the sides (the ones created by the bridge tool). Alternatively you can select Select / Invert in the Selection in the CINEMA 4D main menu - since the front a back side of the shirt should still have been selected, this can save you time.

These polygons will serve as the T-shirt's seam. The Cloth engine will do this for us as well. Select Seam Polys in the Dresser menu and set it to Set. The seam is still a little too wide. Click on Dress-O-Matic and look what happens with the T-shirt.

The seam will be pulled together in accordance to the Width value. It doesn't necessarily match the shape of the character's body, though. The Steps value determines how exact this fit will be. After setting the Init. State, click on Relax.

Now other forces, such as gravity, will have an effect on the T-shirt which makes it sag on the character's shoulders.

Place a Cloth NURBS into the scene (Simulate / Cloth / CNURBS). Make the T-shirt a child of this object.



Cloth NURBS acts similar to a HyperNURBS object: it smooths the geometry which was subordinated to it but with a slightly different algorithm which works better for cloth objects. Additionally, a thickness can be specified for Cloth NURBS fabric objects.

Set the Thickness to 1 or 2 in the Attribute Manager and the subdivision to 0. Create a HyperNURBS object and make the Cloth NURBS object to a Child object of this HyperNURBS object. Now the Cloth NURBS object will concentrate on the thickness of the cloth and the HyperNURBS object will take care of the T-shirt's edges.

The character should be clothed now. Of course there is still some fine-tuning necessary to make the T-shirt behave properly in an animation. As you can see, though, the first steps weren't that difficult.

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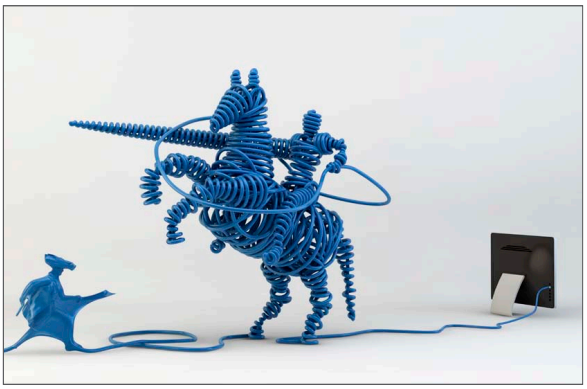

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HAIR

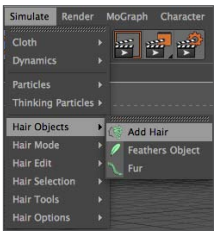
CINEMA 4D Studio features a hair rendering and simulation system that you can use to easily create hair, fur and feathers. This tutorial will show you how.

1. Introduction

HAIR is a powerful tool for creating various types of hair and fur. Even feathers, animated grass, and much more can be created using HAIR.

Although achieving your first results in HAIR is relatively easy, HAIR is an immensely diverse and comprehensive tool that will satisfy any beautician.

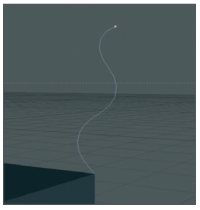
HAIR can be accessed from the Simulate menu at the top of your standard interface.



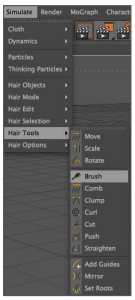
HAIR's only limitation is your fantasy, whether it's creating fur for a rodent, feathers for a ruffled chicken, the perfect English lawn or the newest hairstyles. And, HAIR is fast – what else have you come to expect from CINEMA 4D? HAIR renders immense amounts of hair with unmatched speed. The variations that HAIR offers are so great that any hairstyle can be created, from smooth and straight to curly or just about anything you can imagine.

2. General Information / Interface

HAIR works with so-called guides that serve as placeholders for the rendered hair.



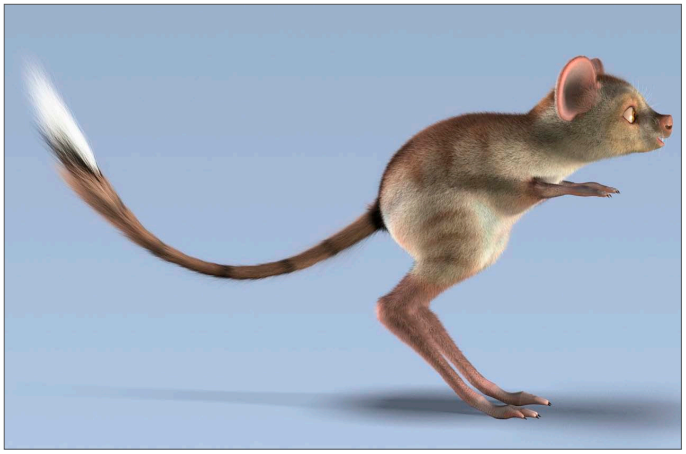
The number of guides displayed in the editor view is far less than the actual number of hairs that will be rendered. The number of guides displayed can also be increased. The missing hairs are interpolated between the guides when rendered. Naturally, you will require some standard grooming tools to bring your hair into shape. Among the tools HAIR offers are Brush, Comb, Scissors and more.



HAIR's own IK makes sure hair moves realistically. Even some of the CINEMA 4D particle modifiers, e.g. wind, can be combined with HAIR and the HAIR dynamics ensure hair behaves naturally. And if you want to transplant hair, that's no problem, either. HAIR lets you easily transplant hair roots.

Before we get started with the HAIR tutorial, though, let's take a look at what can be created with CINEMA 4D's HAIR system:

3. Sample Images



© Johan-Bernd Zweverink

4. Quick Tutorial – Fur

Our volunteer, Hairbert, is only a few mouse clicks away from becoming his warm winter fur. He may look a little pitiful without his fur but his simple construction will make our work that much easier.

© Kaan Özsoy - www.idapictures.com

First, open the file QS_Hair.c4d.

HAIR can be applied to either an entire object or a polygon selection only. Since we want to give Hairbert's face a different fur than the rest of his body we will only select those polygons to which our first fur type (long fur) should be applied. Go to the Object Manager and select the Bear_mesh object. Make sure the Use Polygon Tool is active in the Mode Palette at the left of your interface. In our example the corresponding polygons should already be selected. All polygons onto which long fur should be placed on Hairbert's body will be highlighted by the orange selection. Select Simulate / Hair Objects / Add Hair in the CINEMA 4D main menu. Subsequently, the guides we mentioned at the start of this tutorial can be seen protruding from Hairbert's body.

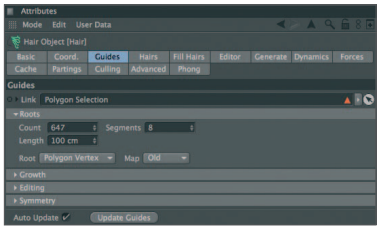
The guides all protrude perpendicularly from each surface and have a default length of 100. Go ahead and Render the scene to see what poor Hairbert looks like (Render / Render View or the far-left render icon).

If Hairbert were a porcupine or had just come out of the spin cycle at 90° we could finish this tutorial at this point. Since Hairbert deserves better we will continue and use the settings described below to give this guy his cuddly winter fur.

When hair is added, a corresponding material will be created automatically in the Materials Manager.

The HAIR object is located at the top of the object list in the Object Manager.

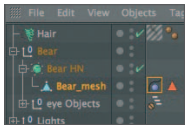
Before we start editing the HAIR material and the HAIR object, we will shorten the guides a little (which will also shorten the rendered hair) and give the hair a little style by applying gravity. Select the HAIR object in the Object Manager. Go to the Attribute Manager and activate the Guides tab. This tab contains the Length and Segments settings.



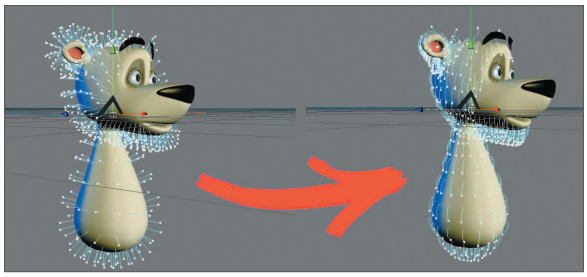
Set Length to 21 and Segments to 6. The Segments setting defines the number of individual segments each guide is made up of (this only influences how guides are displayed in the editor and its dynamic behavior, not the rendered hair. For example, a hair with only 3 Guides segments will behave very stiffly when affected by gravity but its subdivision of 12 in the Hairs tab will result in a smooth rendered look). If Segments were to be set to 1 each guide would consist of only a single segment and gravity could not bend the guide. Our guides have 6 segments, which means they can be bent at 5 points along their length (see the Tips & Tricks chapter for further details concerning guide segments).

Now switch to the Forces tab and activate the Surface to Hair setting. This will prevent the hair tips from penetrating any surfaces when gravity is applied (collision detection). If we were to apply gravity at this point, though, the hair tips would still penetrate the polygon mesh since we have not yet told the polygon mesh that it should interact with the hair.

To do so, click on the Bear_mesh object in the Object Manager and assign to it a Collision tag (right click: Hair Tags / Hair Collider).



If you play the animation now you will see how the hair is pulled down by the gravity (to make the animation of the Guides visible, make sure that the Hair object is selected in the Object Manager).



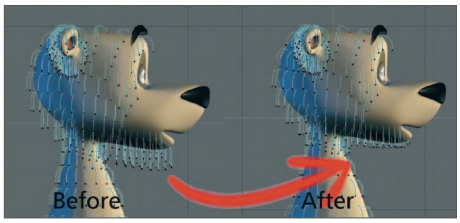
Stop the animation before it reaches frame 100 to prevent the calculation from starting anew. Alternately you can start the Dynamics calculation in the HAIR object by pressing the Relax button in the Dynamics tab's Animation group (Click this button after the animation has been set to frame 100).

In order not to lose this state we have to tell HAIR that this should be our new initial state. Simply setting the animation back to frame 0 will set the calculation back to its original state and Hairbert would again look like a porcupine in shock.

To prevent this from happening select Simulate / Hair Edit / Set As Dynamics in the main menu. Now we can cut and style Hairbert's fur.

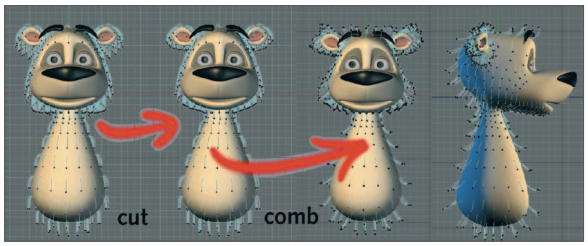
Switch to the left view (by pressing F3) in the editor window and activate the Cut tool (Simulate / Hair Tools / Cut). Next, deactivate Visible Only in the Attribute Manager to make sure hair that is not visible will be cut as well. Now set Form to Circle and let's start cutting.

To cut Hairbert's hair simply click and drag over the blue tips of his hair. Cut his hair as shown in the screenshot below:



Switch to the front view in the editor window so we can trim and style the hair on Hairbert's chin a little. Activate the Brush tool (Simulate / Hair Tools / Brush). Activate the Collisions setting (one of the Brush tool's most important settings (Options tab)) and set Coll. Radius to 1 cm. Doing so will prevent the hair from penetrating Hairbert's skin when brushed. Leave the Deactivate Visible Only option disabled here as well.

Switching views as needed in the editor view can be very helpful when brushing or styling hair. To brush hair, simply click and drag over the blue hair tips. The guides possess their own HAIR IK which ensures hair-like behavior when the hair is styled. To create our fur we will need to pull the guides out a little and curl them up slightly at the tip. Take a look at the following screenshots to get an idea of what we mean.

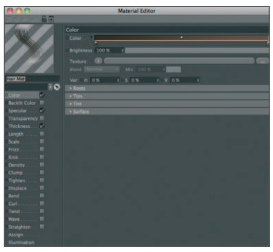


After you've had your fun with Hairbert's hair and it has the look you want switch to the perspective view in the editor window and position Hairbert so you can take a good look at him. Render the view and see what Hairbert looks like (main menu: Render / Render View).

It seems that Hairbert is suffering from a minor case of hair loss. This is not due to stress but the fact that we still need to make some changes to his hair settings. We'll do that now.

First, we will turn our attention to the number of hairs Hairbert has. Select the HAIR object in the Object Manager and set Count to 100,000 in the Hairs tab menu in the Attribute Manager. Activate Fill Hairs in the Fill Hairs tab and set Count to 80,000. Render the scene again. It should look similar to the image below. Poor Hairbert has been transformed from a porcupine to a bad Prince Valiant look-alike. We'll have to make more changes.

The properties of Herbert's hair still have to be edited extensively so let's start by double-clicking the HAIR material in the Materials Manager. This will open the material's dialog window with all its options and channels.



Follow these steps:

- Specular: Set Primary Strength to 34% and Secondary Strength to 50%.
- Thickness channel: Set Root to 0.5 cm and Tip to 0.03 cm. This will thin Hairbert's hair to make it look more realistic.
- Scale: Activating this channel will vary the size of the hairs, which adds additional realism. Set Scale to 100%, Variation to 80% and Amount to 40%.

Render the scene once again. The result should look like the next image:

As you can see, Hairbert's bad hair day is slowly but surely coming to an end. His fur is starting to look much more realistic. We'll remove some of its smoothness and shine by adding a little frizz. Select the Frizz channel, located below Scale, and set Frizz to 15%.

Hairbert's looking better and better. Soon he can let himself be seen in public again. What we want to do now is get rid of that just blow-dried look and clump the hair a little. We will do this using the Clump channel.

Select the Clump channel and change the settings to match those in the next image:

Render the scene again. The result should look like this:

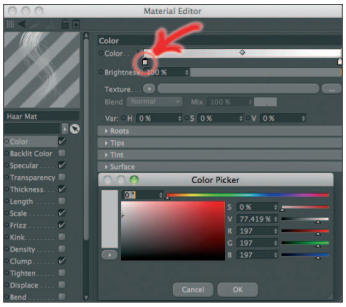
So what's left to do? Right, Hairbert's face still needs some hair. As mentioned at the beginning of this tutorial, we will apply a different type of fur to Hairbert's face. This time it will be even easier to apply! Again, we have pre-selected the polygons for you to which this fur will be applied.

First, make sure the Use Polygon Tool is active and select the Bear_mesh object in the Object Manager. The polygons to which we just applied Hairbert's long fur will be highlighted in red. Select the second of the five triangles with the red border next to Bear_mesh in the Object Manager. In the Attribute Manager you will see Hair Short in the Name text field. Click on Restore Selection or double-click on the triangle below this text field. If you followed all steps correctly the polygons on Hairbert's face and ears should be highlighted in orange.

Since we just covered the following steps in the creation of Hairbert's long fur we will simply list them for you here. Give your new HAIR object (e.g. Short Fur) a different name to avoid confusing it with the long fur.

1. Add Hair (main menu: Simulate / Hair Objects)
2. Set guide Length to 5 cm, Segments to 4 (Attribute Manager)
3. Activate Fill Hairs.
4. Set Count for hairs and fill hairs each to 250,000.
5. Reduce hair (not guide) Segments to 4.
6. Open the HAIR material (double-click the material in the Materials Manager).
7. Set Root to 0.3 and Tip to 0.01 in the Thickness channel.
8. Activate the Straighten channel and set Strength to 70%.

Since Hairbert was born in Alaska we'll have to change his look a little. Double-click one of the HAIR materials in the Materials Manager and select the Color channel. Double-click the left-most color marker.



Change the color to a very light gray and click on OK. Now select the right-most color marker and change its color to white. Do the same for the remaining HAIR material and render the scene.

You may have to tweak the colors a little but your result should basically look like this:

Congratulations! You have just completed your first HAIR project. It's that simple! Now take what you have learned here and experiment with adding hair to other objects, transitioning from long hair to short hair, creating different styles, even creating grass and more. The only limitation HAIR has is your own imagination.

5. Tips & Tricks

• You can save a lot of time by optimizing your HAIR settings. Make sure your object really needs those 500,000 individual hairs - maybe half as many will suffice without sacrificing realism.

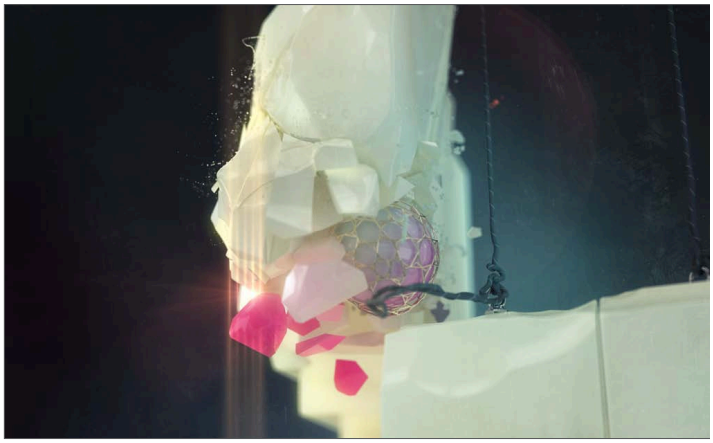
• A greater number of individual hairs are required when creating short hair (as was the case with Hairbert's fur) to prevent surfaces from showing through. Short hair, though, requires fewer segments because it is stiffer by nature. Increasing the segment count for short hair is therefore unnecessary.

• The method of creating hair used in this tutorial is by far not the only method for creating good-looking hair. You can, for example, experiment with the various HAIR modes when brushing hair (main menu: Simulate / Hair Mode / Points). Since guides behave differently when working in Point mode, as opposed to Tip mode, entirely new possibilities for styling hair are made available.

• Experiment with the guides' Segment setting. If you set the number of guide segments to 3 and the number of hair segments to 20 the hair would be very bouncy and protrude a greater distance from the surface. The rendered hairs would look round and have no corners. The hair will look like it hasn't been shampooed for several days.

MoGraph

CINEMA 4D's MoGraph features make it easy to achieve complex-looking effects. MoGraph is available in CINEMA 4D Broadcast and Studio.



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1. Introduction

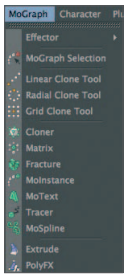
MoGraph is designed to clone just about any geometric primitive or object and offers numerous Effectors with which these objects can be controlled. For example: Large objects (which are made up of several smaller ones) can be exploded, deformed and morphed into another object; many small objects can be controlled by a target object to which they have been assigned; a surface made up of various objects can be deformed using a shader; spheres can suddenly appear and come together to form a word.

The possibilities are endless! Even dynamic effects such as objects falling and colliding can easily be handled by MoGraph.

MoGraph offers creative minds a virtual universe of endless possibilities. Once you complete this tutorial we urge you to let your creative juices flow – experiment to your heart's desire and see what MoGraph can do!

2. General Information / Interface

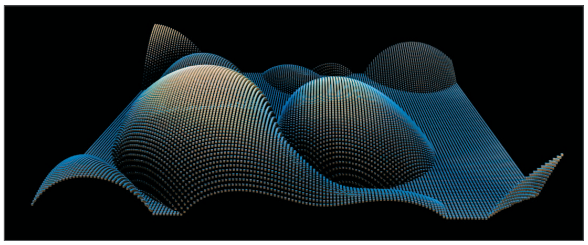
MoGraph can be accessed in the CINEMA 4D main menu.

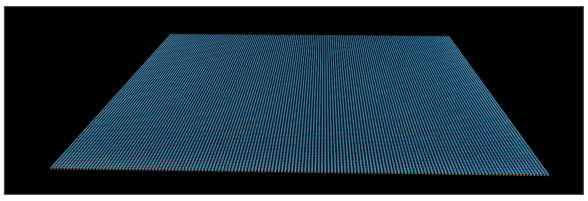


In most cases, a Cloner object will be required in order to create a MoGraph scene. The Cloner object contains all functions required for the creation and depiction of clones. The Cloner object is then augmented by the various MoGraph Effectors. Below is a sampling of Effectors and how they work:

- Delay Effector: Use the Delay Effector to delay any action or keyed animation of a cloned object (see chapter 6, Tips & Tricks).
- Shader Effector: The Shader Effector analyses textures or shaders applied to clones and uses their height and depth information to deform the clones' surfaces. For example, a noise shader, including its gray scale values, can be loaded into a Shader Effector and subsequently be animated. This animation will then affect the clone onto which it is applied.

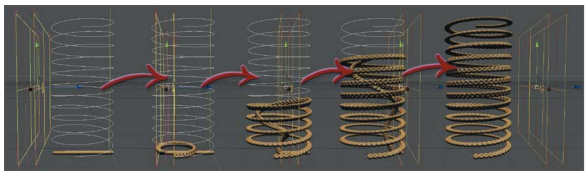
  The following two screenshots show a clone with and without a Shader Effector with an animated noise shader applied.





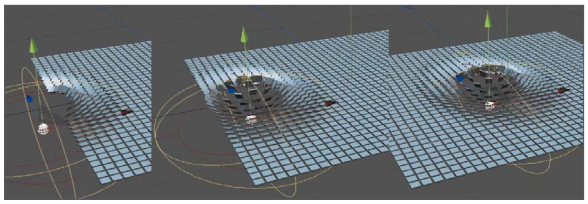
• Spline Effector

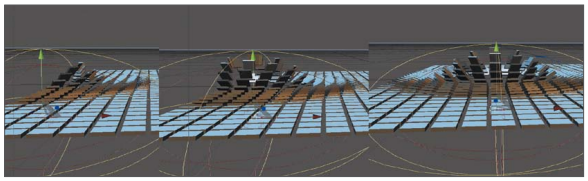
You can use the Spline Effector to link spline-based shapes or objects to the Cloner object. Clones can be aligned to create text or morphed into text or other shapes. The image below shows how a Spline Effector, with Falloff set to Linear, (moved in the direction of its own Z-axis) was used to morph a row of donut clones into a helix shape.



• Target Effector

The Target Effector lets clones be aligned to a target object. The clones will follow the movement of the target object accordingly. In the image below, a ball was used as the target object, to which a Target Effector, with its Repel setting activated, was assigned.





This is also the scene we will use for this tutorial.

Before we get started, sit back and take a look at what MoGraph can do. Maybe the following images can say more about what MoGraph can do...

3. Sample Images

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4. Target Effector

In this tutorial we will show you how to achieve fantastic results with just a few clicks of the mouse. MoGraph has been designed to quickly master tasks that, until now, either took hours to complete or simply were not possible.

For example, the Target Effector: How would you animate 1000 clones that follow a target object without the use of MoGraph? Well, we won't waste any time trying to answer that question. Instead, we will show you how easily it can be done using MoGraph.

We will require the following items for our scene:

- Cloner object
- Target Object (a simple parametric object)
- Target Effector
- Primitive (the object to be cloned)

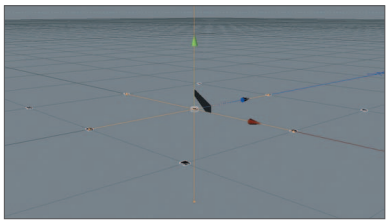
All we need for this tutorial is these four simple items – MoGraph will do the rest. All you have to do is be creative (as you surely always are...).

Create a Cloner object (main menu: MoGraph / Cloner) and a cube (main menu: Create / Object / Cube).

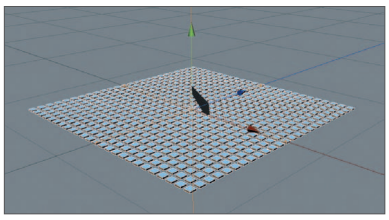
The cube will serve as the object to be cloned and will be made a child of the MoGraph Cloner object in the Object Manager. Before this happens, though, the cube has to be resized. Set the size of the cube in the Attribute Manager at the bottom right to: X=4 cm; Y=1 cm; Z=4 cm. Once the cube has been rescaled you may have to zoom in to the cube a little to get a better view of your scene. In the Object Manager drag the Cube object onto the MoGraph Cloner object. This will make the cube a child of the Cloner object and simultaneously tell the Cloner object to affect the cube.

If you didn't zoom in too far you will see that two additional cubes have been created (you may have to adjust your editor window to see the cubes). These cubes are located above the original cube, with relatively large intervals between them. This interval represents the default interval the Cloner Object applies. Since we will be creating a surface comprised of many cubes we will now adjust the Cloner object's settings accordingly.

Select the Cloner object in the Object Manager and take a look at its editable settings in the Attribute Manager below. You will see that the Cloner object's Y-value is set to 50m, but we need our clone to move in the Z and X directions. Set Mode from Linear to Grid Array at the top of the Attribute Manager. The clones will now be arranged into a cube. To flatten our arrangement of clones we will now set the Count's Y-value to 1. Your scene should now look like this:



Our surface is taking shape nicely. Only the number of clones needs to be increased. Set the Cloner object's X and Z count to 25 each. In order to increase the density of the surface, the clones need to be closer together. To do this, change the Cloner object's Size X and Z values from 200 to 150 (the left and right fields). The Y-value can remain unchanged since we haven't cloned the cube in the Y direction. Your scene should now look like this:

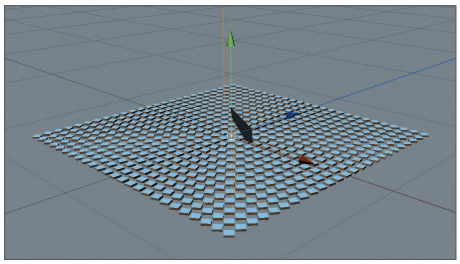


All we need now is a Target Object and a Target Effector. Create a Target Effector by selecting the Cloner object in the Object Manager and subsequently selecting Target Effector from the MoGraph menu (main menu: MoGraph / Effector / Target).

> **Note:** Always make sure that the Cloner object is selected when adding an Effector. The Effector will then automatically be added to the Cloner object's Effectors tab. Otherwise you may forget to add the Effector manually and wonder why the Effector is not working. You can read more about Effectors in the integrated CINEMA 4D documentation files.

By having selected the Cloner object subsequently assigning the Effector on the Cloner object's Effectors page is no longer necessary. The Effector already knows it should affect the Cloner object.

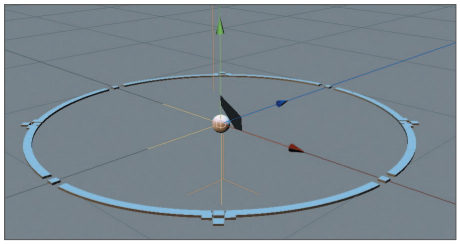
Your scene should now look like this:



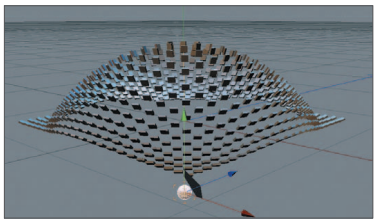
Next we will add a sphere to serve as a Target Object. It really is not necessary to add this sphere but we will add it on here in order to better demonstrate (visually) how this effect works.

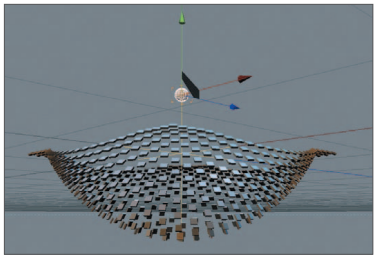
Create a sphere and set its radius from 100 cm to 5 cm in the Attribute Manager. The sphere now has to be made the Target Object. Open the Target Effector's Effector tab in the Attribute Manager and drag the sphere from the Object Manager into the Effector tab's Target Object text field. That's it!

You can now move the sphere in the editor view and the cube clones will always follow the sphere. We will now go a step further and apply a Repel function, located in the Target Effector's Effector tab. Leave the sphere at the center of the scene (where it was created) and activate the Repel function. The result should look like this:



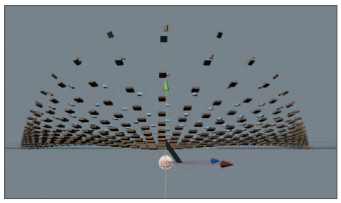
The clones will be repelled radially from the sphere. Move the sphere along any axis and see what effects result:





That basically completes our tutorial, except for the fact that we wanted to simulate the effect shown in the screenshots.

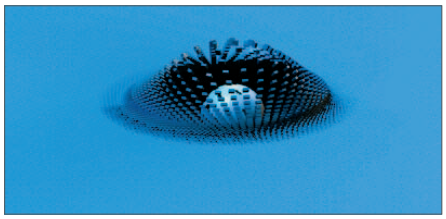
To achieve this effect we will have to add an additional function: Falloff. Place the sphere at the center of and slightly below the clone field.



Open the Target Effector's Falloff tab in the Attribute Manager. Set Shape from Infinite to Sphere and set Scale to 20%. This will define a smaller radius within which our Effector will affect the clones. Our clones are still being repelled much too far away from the sphere. To change this, go to the Target Effector's Effector tab and reduce Distance to 20m and Distance Strength to 50%.

If you move the sphere you will see that only a small number of clones are affected by the movement of the sphere and the remaining clones are not affected at all. In order for all clones to be affected by the movement of the sphere the Target Effector must be made a child of the sphere (Object Manager).

The following look can be achieved by simply increasing the number of clones:

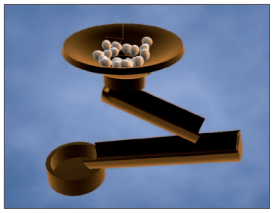


5. Quickstart Tutorial: MoDynamics

Simply linking any given object with a Cloner object in conjunction with a single Dynamics Body tag is enough to create an interesting, dynamic movement. It's easy to get caught up in experimenting with the various parameters to see how the movement is affected. The Dynamics functionality requires only very basic knowledge of CINEMA 4D and physics in general to be able to create impressive effects. In this tutorial we will briefly explain how this very powerful tool works.

The first step in creating an animation using MoDynamics is to make any given object a Child object of a Cloner object. To get an impression of how easily and quickly MoDynamics can be used to affect objects, open the file QS_eggloop_final.c4d from the Quickstart Tutorial folder (located on your demo DVD, goodies DVD or online at www.maxon.net for download).

The animation used for this tutorial demonstrates clearly how precisely the Dynamics calculations work. Each time the animation is played, each individual egg will have the exact same motion and collide with the same objects in exactly the same manner. This is very useful when placing cameras, for example, because the animation will always remain the same. You can, however, still modify settings to modify the animation, if desired. For this tutorial we will keep the settings as they are so we can better introduce you to the basic workings of MoDynamics.



Open the file QS_eggloop_start.c4d. This scene is similar to the previous one but is somewhat simplified. You will be surprised at how easily it is to get the ball (or in our case egg) rolling with MoDynamics. Select the egg object in the Object Manager and, while pressing the ALT-key, call up the Cloner object from the MoGraph menu (main menu). By simultaneously pressing the ALT-key our object will automatically be made a Child object of the Cloner object. We now have to modify some settings for the Cloner object.

Select the Cloner object in the Object Manager and set Mode from Linear to Radial in the Attribute Manager. This will arrange the objects in a circular manner. However, the orientation must still be modified. To do so, set Plane from XY to XZ. Count and Radius are set to 5 and 50 meters, respectively. For our scene, however, we need to change these values to 12 and 1000.

We've made a few modifications to our scene but it's still not finished. But we are only two clicks away from doing so! Right-click on the Cloner object and the bowl object, respectively, and assign each a Rigid Body tag (Simulation Tags / Rigid Body).

Note: The workflow in CINEMA 4D Studio differs slightly from that of CINEMA 4D Broadcast. This is in part due to the fact that the MoGraph Dynamics Body tag in CINEMA 4D Broadcast has less functionality than in CINEMA 4D Studio. The CINEMA 4D Studio Dynamics settings are much more comprehensive and as a result have different default settings.

If you own CINEMA 4D Broadcast you can play the animation directly; owners of CINEMA 4D Studio will be able to do so after just a few clicks.

Select the Bowl object's Rigid Body tag and set its Dynamic parameter to Off in the Dynamics tab. Switch to the Collision tab and set the Shape to Static Mesh. Select the Cloner object's Rigid Body tag and set its Individual Elements setting to All. Play the animation by clicking on the Play arrow in the Timeline. As promised, we quickly and easily created a basic - but interesting - MoDynamics animation with very few steps. If you select one of the Rigid Body tags you can modify various settings in the Attribute Manager to, for example, make the eggs elastic so they can start bouncing around - for whatever reason. You can also increase the friction so the eggs move sluggishly. You are now free to modify the settings to your heart's desire to see what type of interesting animations you can create with these few objects.

6. Tips & Tricks

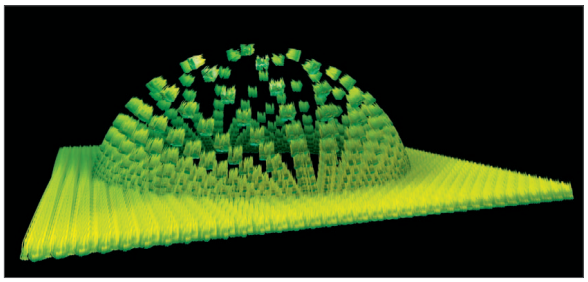
• The MoGraph Cloner object contains the Object mode. The quantity of clones will orient itself according to the points (default setting) of the object to which they are linked. HyperNURBS can be used to create a smooth animation with a high number of clones. The HyperNURBS object will be used by the Cloner object in place of an actual polygon object. Depending on the HyperNURBS' settings, the number of clones, for display in the editor view or for rendering, can be controlled using HyperNURBS subdivision. This means you can, for example, have no clones visible in the editor view yet very many visible when the scene is rendered.

• As mentioned in chapter two, the Delay Effector will delay all movement of a Cloner object's keyed animations. If, for example, you want to morph a face consisting of many objects into another one: Set the Cloner object's mode to Object and define an object in the Object field. Objects can then be switched per keyframing. Because the resulting animation would simply switch the objects from one state to the next in the next frame, the Delay Effector can be applied so the Cloner objects transform slowly.

• Unbelievable but true: MoGraph can even be combined with HAIR!

Simply plant hair onto a polygon object, make the HAIR object a child of the polygon object and this in turn a child of the MoGraph Cloner object. Each animated clone will then be covered with the hair you just created - including HAIR dynamics! Our Quickstart scene could then look something like this.

Now go wild with MoGraph and see what interesting animations you can create. Have fun!



Note that using MoGraph in conjunction with HAIR has its limitations. HAIR dynamics reference the original clone and will not be calculated anew for each cloned object. This means that hair on a clone that is oriented horizontally will not fall to the side when the original object is oriented vertically.

• The settings that define the MoDynamics' accuracy and the gravitation are located in the Project Settings... Dynamics tab. These settings apply to the scene as a whole and not only to individual Cloner objects or Dynamics Body tags.

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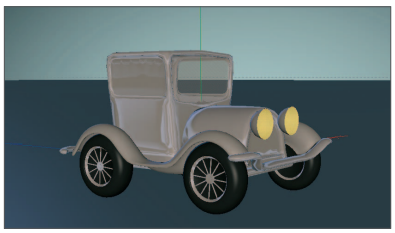
Dynamics

In this tutorial we will show you a few of the CINEMA 4D Dynamics functions. CINEMA 4D Dynamics are a powerful and multi-faceted tool for the creation of all types of dynamic calculations, object collisions and the general propulsion of objects, including motorized vehicles. Since the general setup of a Dynamics scene is similar to that of a MoDynamics scene we will not simply let objects collide, as we did in the MoDynamics chapter. We will go one step farther and will equip a vehicle with a motor and let it drive.

Open the file QS_Dynamics_start.c4d.



The scene contains an old-timer, which we will equip with a motor using only a few objects and by modifying a couple of settings, which will cause the car to drive.

As you can see, a polygon object was used to create the car body and the wheels. We could have created the scene using individual objects for each wheel but to keep things simple for this tutorial we simply used four Primitives. All we have to do now is link the tires with the car body and make the tires rotate using a Motor object.

First, create a Motor and two Connectors from the main menu: Simulate / Dynamics.

Select all three elements in the Object Manager and set their H rotation angle collectively to 90°.

This will ensure that all three objects have the same orientation as the wheels.

Next, rename the Connectors to Connector_front and Connector_back, respectively, and make them Child objects of the wheels_front and wheels_back objects, accordingly. After doing so, set all three position values (X,Y,Z) for the Connectors to zero in the Coordinates Manager (don't forget to click on Apply when finished!). Make the Motor object a Child object of the polygon object car.

Zeroing out the position values again will not be necessary. Now that the objects have their positions and orientation defined all we have to do is define the dependencies of the elements. The fastest way to do this is:

Select the objects Motor, Connector Front and Connector_back in the Object Manager (Ctrl / Cmd + click for multiple selections).

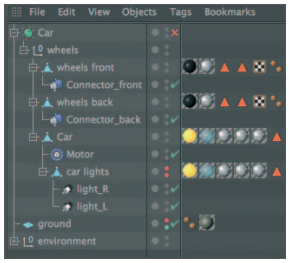
Two fields will be made available in the Attribute Manager - Object A and Object B. These fields can be used to link objects. We have to tell the Motor object and the Connectors that they have to link to the car body and wheels.

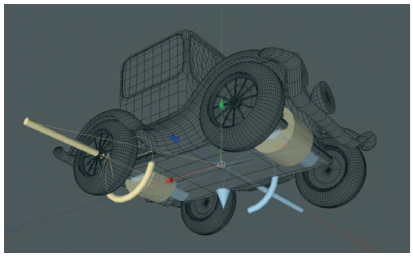
Drag the wheels_back object into the Object A field and drag the car object into the Object B field.

This will create the links for all three objects.

The object Connector_front must be selected so the wheels_front object can replace the wheels_back object in the Object A field (drag & drop).

Compare your Viewport and Object Manager with the screenshots below - they should look the same.





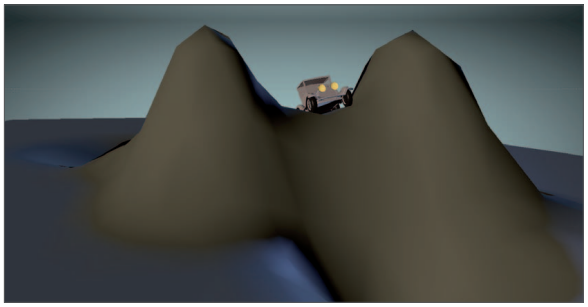
The car has now been set up correctly and all we need to do now is add dynamic movement. This will be done by adding a Dynamics tag.

Again, make a multiple selection and select all of the polygon objects: wheels_front, wheels_back, car and ground. Right-click on one of the selected objects and select Simulation Tags / Rigid Body from the menu that appears. Next, select the ground object's Dynamics Body tag and set the Dynamics parameter to Off (Attribute Manager: Dynamics tab).

We want the ground to act as a collision object but don't want it to move at all.

Before we play the animation we will give the motor more power by setting its Torque to 200 (Object tab).

If you play the animation the car will drive across the ground. An additional example can be found by opening the QS_Dynamics_final.c4d file in which the old-timer tuckers across a hilly terrain. Experiment yourself by placing obstacles in the car's path or deforming the ground. Dynamics will react to the changes automatically.



Sculpting

Welcome to the Quickstart sculpting tutorial. With the introduction of CINEMA 4D R14, a powerful new sculpting tool is available to users and offers comprehensive organic modeling features. In this tutorial we will show you how to get started with the CINEMA 4D sculpting tool. We will show you how to create the object in the image below.

At the left is the base object. It contains practically no details and looks quite bland. On the right side is the same object after being modified using the Sculpt tools. The comprehensive toolset makes it possible to create incredibly detailed surfaces. After you complete this tutorial we encourage you to experiment with the various tools to see what they can do.

Since this is an introductory tutorial whose aim it is to show users the basic sculpting functions in CINEMA 4D, we will only sculpt the head.

Before we get started and to help inspire you to higher heights, let's take a look at a finished version of our turtle in its entirety.

Open the file 'Sculpting_Turtle.c4d'.

At the top right of your interface, select Sculpting from the Layout drop-down menu.

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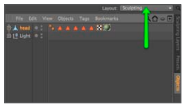
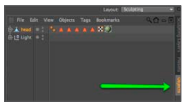
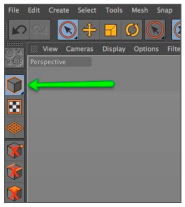


To begin sculpting we must first select and subdivide the object. Click on the Objects tab at the right of the Object Manager.



Select the object 'head' in the Object Manager. Make sure that you are in Use Model mode in the left Icon Palette. If not still there, switch back to the Sculpting Layers tab in the Object Manager.



Next, click on the Subdivide button 6 times. The first click transforms the polygon object into a Sculpt object and automatically assigns a Sculpt tag to the object. The first click will give the mesh a sculpting Level of 0. Each additional click will subdivide the mesh further. After 6 clicks your mesh should have a Subdivide level of 5 (the Subdivision level is displayed in the Sculpting Layers tab's Level field). Although the wire frame display is useful for polygon modeling it can be a hindrance for sculpting because of the high level of subdivision. To make the surface visible, select the Pull brush and press the W key on your keyboard. This will disable the wire frame display. Any brush stroke we make can be undone by simply selecting Undo. Generally speaking, a graphics tablet is better suited for sculpting than a mouse because it lets you control your strokes more precisely.

We will now add a Sculpt Layer to our base object. In the Sculpting Layers tab, select Add Layer from the Layers menu. Next, select the Pull brush and switch to the Stencil tab in the Attribute Manager. Drag the texture Turtleskin.png from the 'tex' sculpting project folder into the Stencil tab's Image field. Alternatively you can click on the button at the right of the Image field and select the texture from the dialog window.

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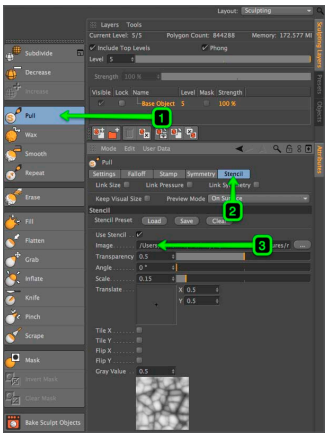
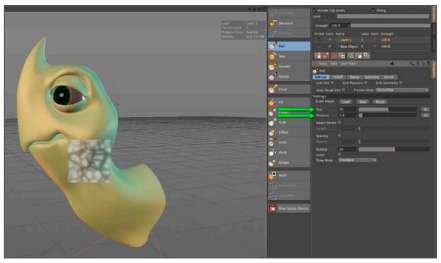
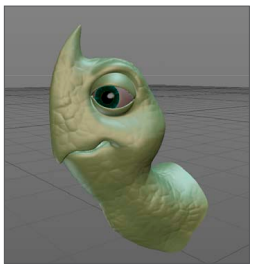


The Stencil you just selected will appear in the Viewport. You can adjust its transparency in the Attribute-Manager as you see fit but a value of 0.5 is a good value with which to start. Enable the Tile X and Tile Y options in the Attribute Manager (Stencil tab). This ensures that the Stencil will be applied across the object's entire surface. Finally, we have to adjust the Stencil's size. The structure applied by the brush is always in relation to the size of the Stencil/object. This means that you can adjust the Stencil size as well as the camera's distance from the object to apply a larger or smaller structure. The Stencil will always lie perpendicular to the camera's angle of view, no matter how you position the camera. Scale the Stencil to reflect the size in the image below by using the Attribute Manager's Scale setting or by using the combination T + RMB until you achieve the desired size. In the brush's Settings menu, set Size to 50 and Pressure to 20%.

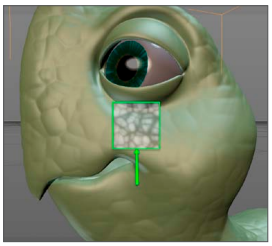
Next, switch to the side view in the Viewport, make sure that you are on Layer 1 in the Sculpting Layers tab, and paint across the turtle's head with the brush. Apply the Stencil using different perspective views and make sure that you only change the camera's angle of view to the object and not its distance from the object. Otherwise the Stencil will be applied in different sizes. When you're finished, press the Q key to hide the Stencil (and again to make it visible).



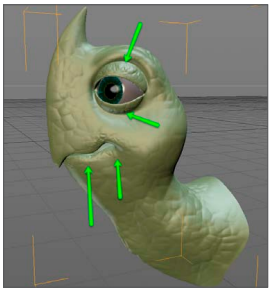
Tip: If you use a graphics tablet you can click on the fx button at the right of the Size or Pressure setting to link the respective function to the pressure-sensitive behavior of your pen. Your turtle's head should look similar to the image below when you're done.



Leave the Stencil size as it is and zoom in on the object. Use the image below as a reference.



Reduce the brush size to 10 and paint over the lip and eye lid regions. The result should look like this:

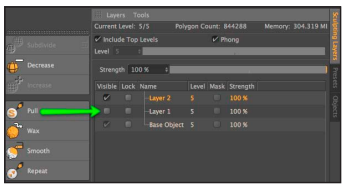


In the next step we will apply a Mask. Click on the Mask button at the bottom of the Sculpt Palette. Add a new Layer as you did before, leave the Size value set to 10 and set Pressure to 5%. Make sure you are on Layer 2 and paint across the turtle's neck to create a surface similar to the one in the image below.

Tip: Pressing the Ctrl key while painting will delete the Mask; pressing the Shift key while painting will smooth abrupt transition. The same applies to the sculpting process: Pressing the Shift key while sculpting will apply a smooth sculpting effect.

Next, click on the Invert Mask button in the Sculpt Palette and then select the Pull brush. Set the brush's Size to 50 and its Pressure to 5%. Paint across the surface of the head as you did before. You will notice that only those regions not affected by the Mask are modified by the Pull brush.

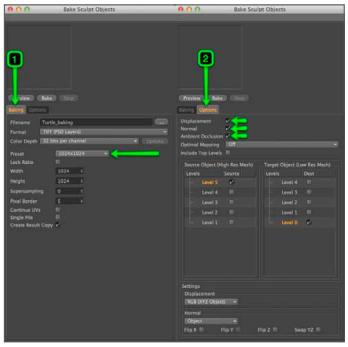
Smoothing tip: While smoothing the folds along the throat we don't want the structure on Layer 1 to be affected. This can be prevented by simply hiding Layer 1 for the duration of the sculpting process.



The final result should look similar to the image below:

We will apply one additional brush to complete our turtle's head: The Knife brush. Delete the Mask by clicking on the Clear Mask button in the Sculpt Palette. Alternatively you can simply hide the Mask in the Sculpting Layers tab, which will make it available for future use. Add a new Layer and select the Knife brush. Set its Pressure to 10% and its Pinch value to 0.25. Paint along both sides of the nose to create a ridge as shown in the image below.

This completes our turtle's sculpted head! Baking an object that contains objects with millions of polygons can reduce the number of polygons to a manageable amount and will produce exactly the same result for rendering! Baking generates Displacement and Normal textures that, simply put, subdivides the geometry during rendering and lets you work with low-res objects in the Viewport while maintaining filigree details for rendering. Baking will not affect the sculpted surfaces. To bake your object, click on the Bake Sculpt Object in the Sculpt Palette and use the settings shown in the next image:



After all settings have been made, click on the Bake button. Before rendering the Project, make sure that the original object is hidden so you don't end up rendering both the high-res and the low-res object at the same time.

Even though this tutorial used an existing object as a basis for sculpting, you can also begin with a simplesphere, for example, and create fantastic objects using the Sculpt tools in CINEMA 4D. After making the sphere, or any other Primitive, editable (C key), there's practically no limit to what you can sculpt.

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